A585 Windy Harbour to Skippool Improvement Scheme

TR010035

5.2 Flood Risk Assessment Part 2

APFP Regulation 5(2)(e)

Planning Act 2008

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

Volume 5

October 2018

Page Left Intentionally Blank

Infrastructure Planning

Planning Act 2008

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

A585 Windy Harbour to Skippool Improvement Scheme

Development Consent Order 201[ ]

FLOOD RISK ASSESSMENT PART 2

Regulation Number:	Regulation 5(2)(e)
Planning Inspectorate Scheme Reference	TR010035
Application Document Reference	TR010035/APP/5.2
Author:	A585 Windy Harbour to Skippool Improvement Scheme Project Team, Highways England

Version	Date	Status of Version
Rev 0	October 2018	DCO submission

Page Left Intentionally Blank

CONTENTS

LIST OF TABLES

APPENDIX E – DRAINAGE DESIGN DEVELOPMENT REPORT

Page Left Intentionally Blank

A585 Windy Harbour to Skippool

Drainage Design Development Report

HE548643-ARC-HDG-A585-RP-D-3198

02 AUGUST 2018

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
Highways England Company Limited registered in England and Wales number 09346363

DOCUMENT CONTROL

Document Title	Drainage Design Development Report
Author	[redacted]
Owner	[redacted]
[redacted]	[redacted] Dawson, Santi Santhalingham
[redacted]	[redacted]

REVISION HISTORY

Version	Date	Description	Author
1.0	02/08/2018	First Issue	[redacted]

REVIEWER LIST

Name	Role

APPROVALS

Name	Signature	Title	Date of Issue	Version

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1.1 This Drainage Design Development Report superseded Technical Note 17 which provided guidance on the design principles required at the preliminary design Stage 3.

1.1.2 This Drainage design development report is intended to be a live document detailing relevant background information, mandatory requirements, DMRB design standards, correspondence to date and points of contact to be used for future detailed design.

1.2 Background

1.2.1 Highways England has been investigating options to alleviate a major bottle neck along the A585 between the Windy Harbour junction and the Skippool junction near Poulton-le-Fylde. As a result of the options work Highways England published the Preferred Route Announcement on 24 October 2017 indicating that an offline 'southern' bypass solution between the two junctions was the preferred solution (hereafter referred to as the 'Scheme').

1.2.2 The A585 (T) is a single carriageway trunk road, which provides the only viable access from the motorway network (M55 at Junction 3) into Fleetwood and its urban areas. As a result, it suffers from extreme congestion. The Government's Autumn Statement in 2014 identified the need for an Improvement Scheme along the A585 between Windy Harbour and Skippool to ameliorate the impact of traffic on the route between the two villages and to remove a major bottleneck.

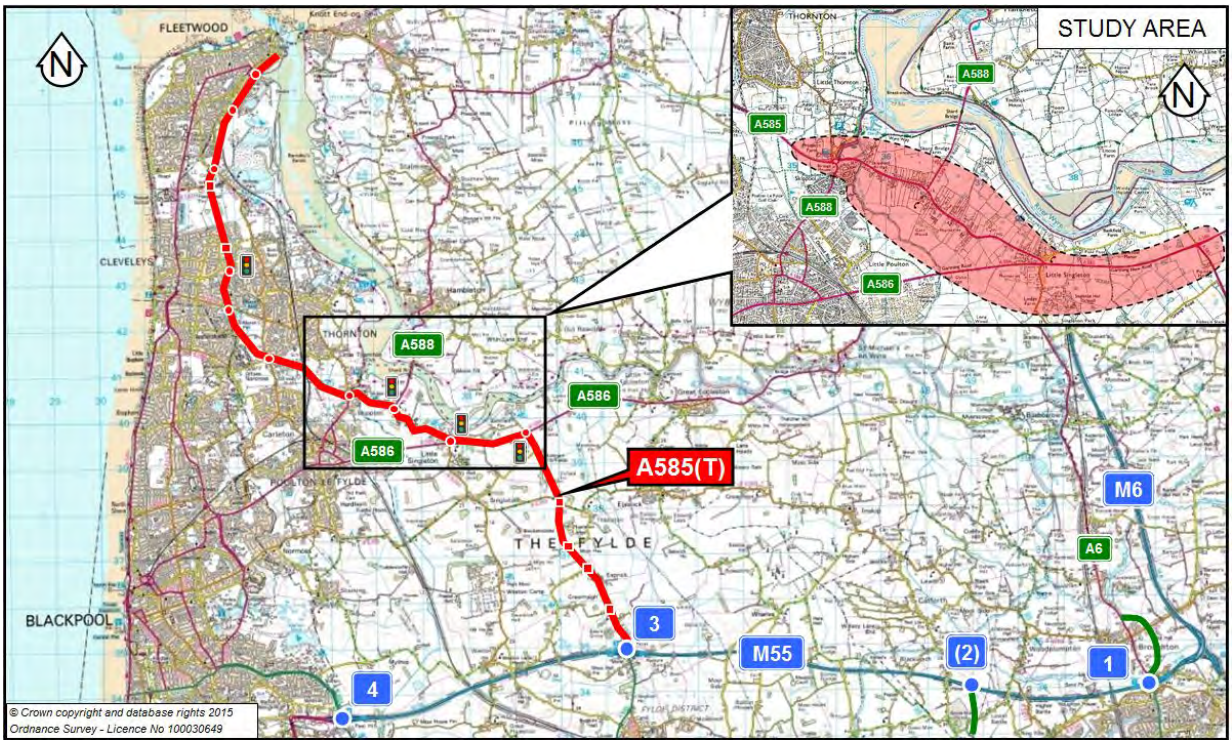


Figure 1-1: Scheme Study Area

1.2.3 The Scheme would follow a route to the south of the ribbon development between Skippool and Little Singleton. It is 4.86km in length, would bypass two of the most significant junction constraints and provide dual-carriageway capacity. Figure 1-1shows the geographic location of the Scheme and the surrounding road network. **Figure 1-2** presents the Scheme.

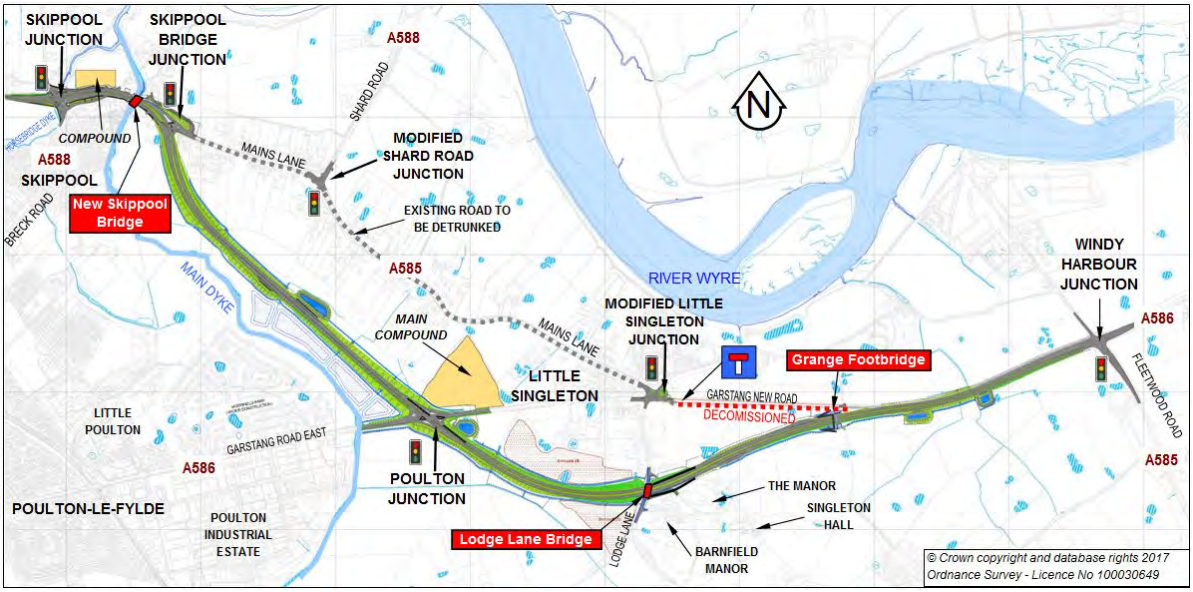


Figure 1-2: The Scheme

1.2.4 Main roads affected by the Scheme are:

- A585 Amounderness Way – the southern end of the single carriageway largely rural trunk road including the Skippool Roundabout junction with A588 Breck Road and B5412 Skippool Road;
- A585 Mains Lane – single carriageway trunk road from Skippool to Little Singleton (Five Lane Ends junction). There are 131 houses, 7 businesses and 2 caravan parks fronting Mains Lane and Breck Road between Skippool roundabout and Little Singleton Junction, there are also 2 set of traffic signals;
- A585 Garstang New Road – rural single carriageway trunk road from Five Lane Ends junction leading to recently upgraded traffic signal controlled Windy Harbour Junction;
- A586 Garstang Road East – Local Road Network (LRN) operated by Lancashire County Council (LCC);
- A588 Shard Road across Wyre estuary – Local Road Network (LRN) operated by LCC;
- B5260 Lodge Lane – cross country road running southwards from Five Lanes End junction that is used as a north-south rat-run to areas such as the employment areas south of the M55 such as Warton and Wesham/Kirkham – operated by LCC.

1.2.5 The landscape surrounding the Scheme is generally low lying and coastal characterised by arable fields, pasture, drainage ditches and small to medium sized blocks of mixed woodland. The Wyre Way regional trail runs east from the edge of the Wyre Estuary Country Park along the southern bank of the Wyre Estuary as far as Little Singleton. Further to this, there is publicly accessible land at The Wyre Estuary Country Park which is located north of Skippool. There is a greater density of residential properties surrounding the western half of the Scheme with farmland becoming more prevalent to the east. To the south of Little Singleton and east of the B5260 there is an area of non-designated parkland (Singleton Park). There are eight Noise Important Areas along Breck Road, Mains Lane and Fleetwood Road within the vicinity of the Scheme.

1.2.6 Environmental constraints within the locality of the Scheme include the Morecambe Bay and Duddon Estuary Special Protection Area (SPA), Ramsar, Site of Special Scientific Interest (SSSI) and recommended Marine Conservation Zone (rMCZ) approximately 500m to the north of the Scheme. There are also three Biological Heritage Site (BHS) designations associated with the Wyre Estuary (important at a local level). The Main Dyke watercourse lies to the west of the Scheme and there are areas of low lying floodplain and some areas of flood zone 3 associated with Main Dyke and the Wyre Estuary covering the Scheme footprint. Heritage features include the Conservation Areas at Poulton-le-Fylde and Singleton as well as isolated Grade II Listed Buildings.

2 EXISTING DRAINAGE

2.1 Existing available drainage data

2.1.1 Existing as-built records and drainage data for the existing A585 trunk road has been obtained from Highways England Drainage Data Management System (HADDMS).

2.1.2 As-built drainage data has also been received from Enterprise Mouchel (Area 13) for the newly constructed Windy Harbour Junction (Drawing number: 780003/501z & 502z).

2.1.3 No data has been received from Lancashire County Council (LCC) for the local drainage networks which connect to the existing A585 trunk road. LCC stated during a walk over survey on the 30/11/2017 that no formal data is available.

2.1.4 This information has been used to determine the existing drainage collector, carrier systems and outfalls serving the existing A585 within the study area.

2.1.5 From a desk top gap analysis study of the available data, additional asset survey will be required to fill the gaps in the missing asset data.

2.2 Existing drainage condition data

2.2.1 A review of the existing drainage assets condition data on HADDMS has confirmed that there is limited data available detailing its condition.

2.2.2 The only condition survey data available is between Skippool Junction and Skippool Bridge and the data shows that the existing network currently has 6no. category 4 defects (holes / broken pipes) and 1no. category 5 defects (collapsed drain). There are also 17no. location where the survey had to be abandoned due to the level of debris, water level and loss of vision. Refer to Appendix A for existing CCTV data.

2.2.3 Consequently, to fill in the asset and condition data gaps a drainage gap analysis set of plans has been created (Refer to Appendix B, drawing numbers HE548643-ARC-HDG-A585-DR-D-3301 To 3312) along with an CCTV asset and condition survey specification. These documents were issued to Highways England in 2017 to procure a CCTV asset and condition survey to allow us to fill in the gaps and verify our assumptions.

2.3 Existing drainage systems

2.3.1 The existing highways drainage on the A585 route within the study area is predominantly by trapped gulley's or kerb off-let gullies connecting to carrier drains, with intermediate chambers, that discharge into field ditches or watercourses. In general, there are no specific measures to treat highway discharges but some of the outfalls are provided with flap valves to prevent backflow of water from the larger watercourses affected by tidal conditions from the River Wyre Estuary.

2.3.2 The exception to the above is the drainage network provided for the recently upgraded Windy Harbour Junction that uses combined kerb-drains that discharge to an oversized pipe that has been provided with a penstock valve and vortex flow control device at the outfall from this catchment.

2.3.3 19no. existing drainage catchment have been identified. These catchments are located at the tie-ins locations of the new offline bypass and along the parts of the existing A585 which will be de-trunked following the completion of the new offline bypass.

2.4 Existing topography

2.4.1 The study area is situated in the coastal plain between the Irish Sea and the River Wyre. The topography of the area comprises a low lying gently undulating terrain. The terrain is dominated by a north-west to south-east running ridge that lies to the South of the River Wyre. This rises from around 13m AOD at Skippool to 24m AOD at Little Singleton. While the top of the ridge is rounded, the side slopes of the ridge fall, typically, at about 1 in 20.

2.4.2 West of the ridge the Skippool–Lytham Channel containing Main Dyke runs in a generally south to north direction and is some 300m to 500m wide. The elevation of the channel is around 4.5m AOD. South of Garstang Road East the main ridge is cut into by a small re-entrant valley approximately 1km long running in a south easterly direction containing a drainage ditch but extends eastwards for a total distance of about 1.6km as a dry valley between Little Singleton and Singleton village.

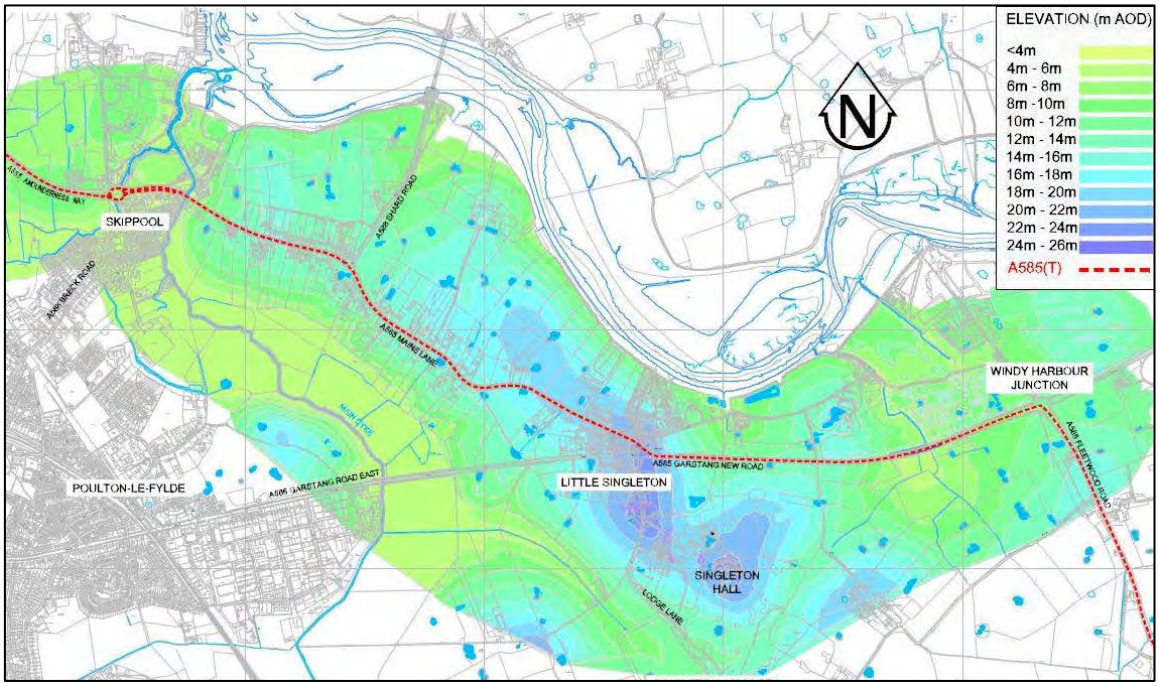


Figure 2-1: Scheme area topography

2.4.3 The existing A585 at Skippool Junction Roundabout is at approximately 6.5m (AOD) and falls (travelling eastbound) over about 0.5km on a very shallow gradient to the location of the Skippool Bridge over Main Dyke. From Skippool Bridge, the A585 (Mains Lane) follows the ridge rising gently to an elevation of 23.6m AOD at Little Singleton. From this high point at Little Singleton in an eastbound direction, the topography drops initially with a 6% gradient, before flattening out and dropping again with a gradient of 3% reaching a low point of about 6.4m AOD approximately 500m west of Windy Harbour Junction. From here, the topography rises to the Windy Harbour Junction at 10.5m AOD with gradients of up to 2.5%.

2.5 Existing waterbodies

2.5.1 There are 4 no. primary watercourses and 5no. minor watercourse / field ditches that have been identified within the scheme area. The Main Rivers listed below are managed by the Environment Agency. The primary watercourses being:

- River Wyre (Main River) – not directly affected by the Scheme
- Horsebridge Dyke (Main River)
- Main Dyke (Main River)
- Un-named watercourse known as Pool Foot Creek

2.5.2 At the western end of the scheme, Horsebridge Dyke falls in a generally north-easterly direction passing under Skippool Roundabout through Skippool Clough Culvert to discharge into the River Wyre Estuary. The culvert is 1.6m diameter of concrete and extended corrugated steel construction and has a 1.6m diameter flap valve at its northern end to prevent tidal flooding. In the event of tidal flooding the flap valve would be shut, and Horsebridge Dyke would be unable to discharge. The Environment Agency manages this flap valve.

2.5.3 The bypass route runs along the Main Dyke valley. Main Dyke is an artificial watercourse constructed between 18th -19th century for the purposes of agricultural drainage and falls in a northerly direction to connect with Horsebridge Dyke before discharging into the Wyre Estuary at Skippool Creek. The watercourse is protected from tidal flooding by a tidal gate about 200m north of the A585 road. The form

of the tidal gate is a pair of flap valves enhanced by lowering gates to be operated in extreme tidal events. This provides protection against tidal flooding to a level of about 6.5m AOD. In the event of tidal flooding the flap valves would be closed, and Main Dyke would be unable to discharge. The Environment Agency manages this flood gate.

2.5.4 Main Dyke has several field ditches that discharge into it along its length as can be seen in Figure 2-2.

2.5.5 At the eastern end of the scheme the only watercourse crosses the bypass route about 0.5km west of Windy Harbour Junction. We have called this watercourse Pool Foot Creek. The watercourse is protected by a flood gate at its discharge into the Wyre Estuary. The level of protection provided by these gates is approximately 6.5mAOD. It is not known who owns/manages this flood gate.

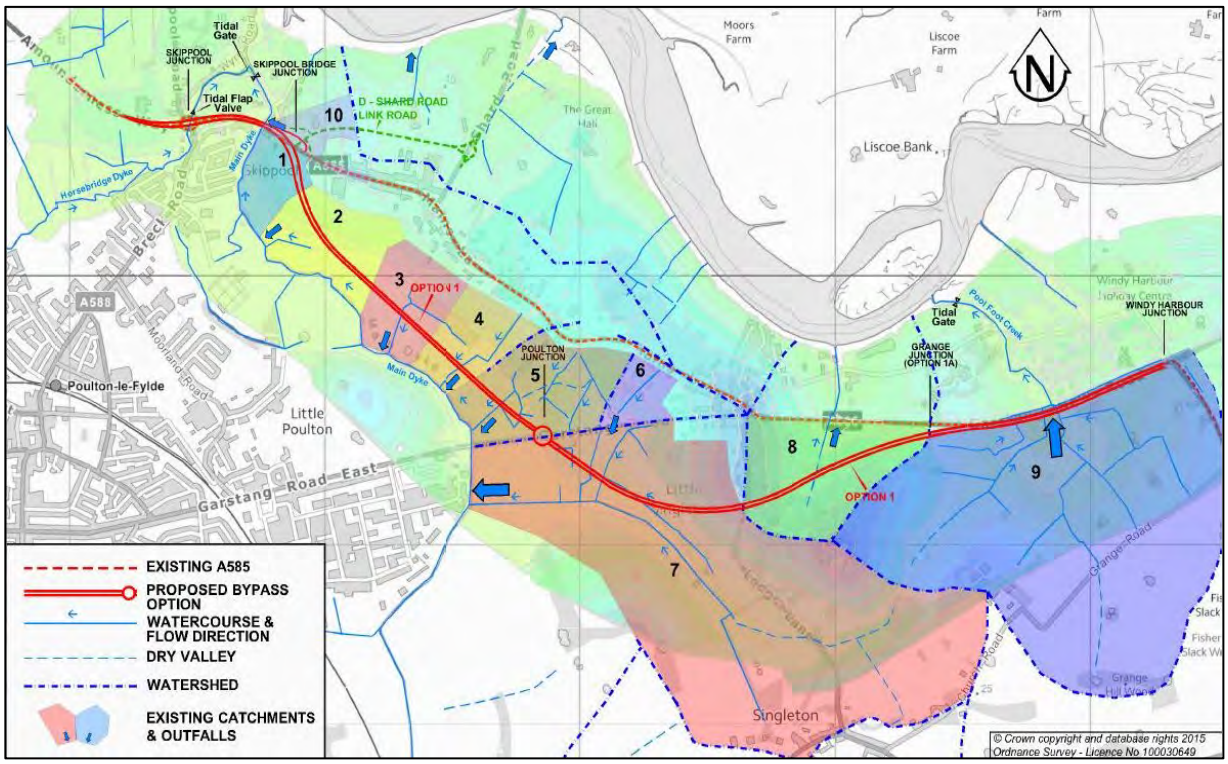


Figure 2-2: Existing Watercourses and Overland Flow Catchments

2.5.6 Apart from watercourses, other waterbodies such as ponds and lakes are also present within the area of interest. Many of the waterbodies are small ponds which are isolated within the adjacent rural areas and can be seen on the Existing drainage and site clearance catchment plan in Appendix C.

2.6 Existing flood risk assessment data

2.6.1 The EA, via their website, provide floodplain mapping data for the UK. The floodplain is the area that would naturally be affected by flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas.

2.6.2 The floodplain mapping shows two different kinds of flooding for the river and the sea and are described as:

- Zone 3 (dark blue) – Shows the area that could be affected by flooding either from rivers or the sea, if there were no flood defences. This area could be flooded:
  - I. from the sea by a flood that has a 0.5 per cent (1 in 200 years) or greater chance of happening each year; or
  - II. from a river by a flood that has a 1 per cent (1 in 100 years) or greater chance of happening each year.
- Zone 2 (light blue) - shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1 per cent (1 in 1000 year) chance of occurring each year.

2.6.3 Where there is no blue shading, flooding from rivers and/or the sea is very unlikely. There is less than a 0.1 per cent (1 in 1000 years) chance of flooding occurring each year. These areas are described as Flood Zone 1.

2.6.4 There are 3no. primary watercourses within the scheme area, which are classified as Statutory Main River as discussed in section 2.5.1

2.6.5 From the EA's flood plain mapping the proposed offline bypass is at risk from 1 in 100-year river flood event and the 1 in 200-year tidal event (flood zone 3), as shown in **Figure 2-3**. The current fluvial flooding is associated with the river being tide locked and the restriction imposed by the existing Skippool Bridge.

Figure 2-3: EA Flood Zone and Main River Mapping (not to scale)

2.6.6 A Flood Risk Assessment report (HE548643-ARC-GEN-A585-RP-EWE-2032) identifies that parts of the bypass route are within flood risk zones 1, 2 and 3 particularly affecting the sections:

- At Skippool Junction
- Between the proposed Skippool Bridge junction and Poulton junction
- Immediately south-west of Poulton Junction; and
- At Pool Foot Creek west of Windy Harbour Junction.

2.6.7 However, it should be noted that the effect of the scheme on these flood zones needs to be reviewed following completion of the Flood Risk Assessment (still to be agreed with the Environment Agency).

2.7 Aquifers and groundwater

2.7.1 The EA provides groundwater mapping data for the UK. Groundwater supplies a third of the drinking water in England and Wales. The EA has a duty to monitor and protect the quality of groundwater and to conserve its use for water resources as set out in their Policy and Practice for the Protection of Groundwater (1998). As a result, the EA have defined Source Protection Zones (SPZs) for 2000 groundwater sources (wells, boreholes and springs) used for the supply of public drinking water.

2.7.2 The shape and size of a zone depends on the condition of the ground, how the groundwater is removed, and other environmental factors.

2.7.3 The maps show three main zones:

- Inner zone (Zone 1) - Defined as the 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres
- Outer zone (Zone 2) - Defined by a 400-day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction; and
- Total Catchment (Zone 3) - Defined as the total recharge area around a source.

2.7.4 An overview of the scheme area shown in **Figure 2-4** below indicates that there are no Inner, Outer or Total Catchment (Zone 1, 2 or 3) source protection zones within the existing A585 truck road corridor.

2.7.5 No discussion regarding groundwater abstraction licenses for public, industrial and agricultural water supplies point has been held with the EA due to the distance the scheme is away from the source protection zones.

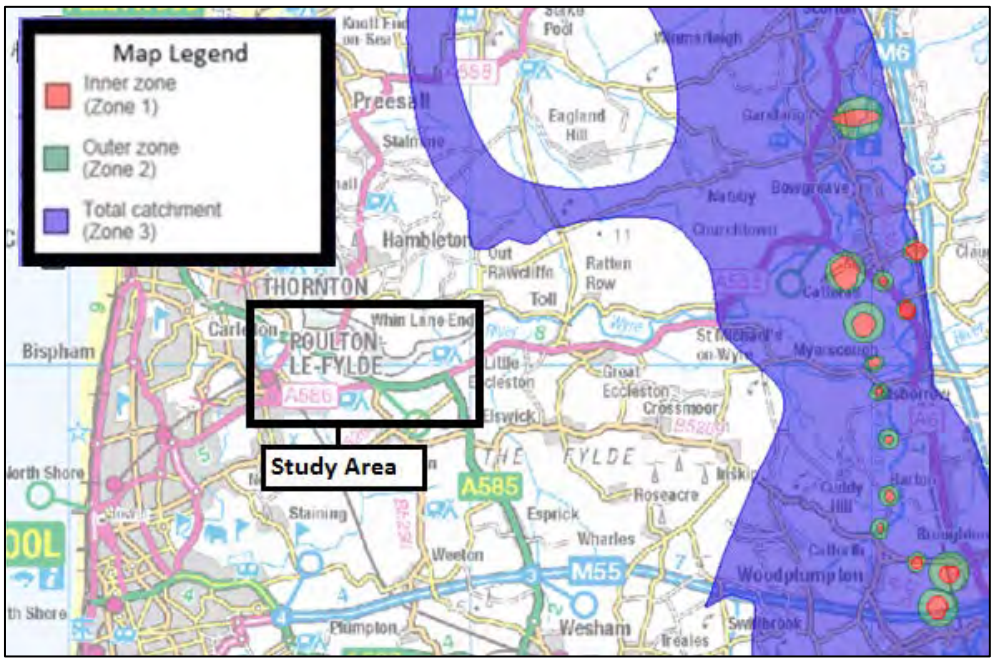


Figure 2-4: EA Source Protection Zone Mapping (not to scale)

2.7.6 A review of the Groundwater Vulnerability Mapping has also been undertaken to examine the EA's assessment of the likelihood of a pollutant discharged at ground level reaching groundwater within superficial and bedrock aquifers. The status of the aquifer shown in **Figure 2-5**is an indication of the importance of the groundwater for drinking water supply.

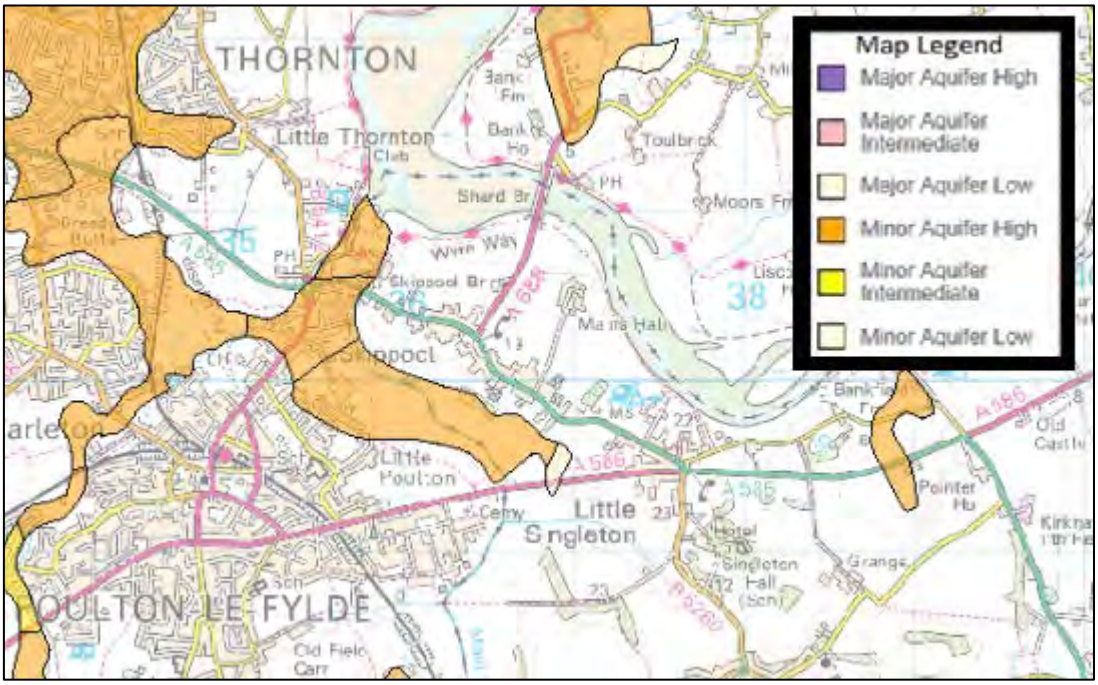


Figure 2-5: EA Groundwater Vulnerability Mapping (not to scale)

2.7.7 Part of the proposed offline bypass is located above a Minor Aquifer which has a vulnerability status of high. The remainder of the scheme located outside of an aquifer.

2.7.8 The groundwater level within the Minor Aquifer is unknown and the existing drainage information suggests that the existing A585 drainage discharges to watercourses and not to ground.

2.7.9 The Groundwater Flooding Susceptibility Mapping (**Figure 2-6**) shows that there is a limited potential for surface water flooding caused by groundwater along the existing A585. As would be expected, groundwater could potential cause flooding at the ground surface close to watercourse locations.

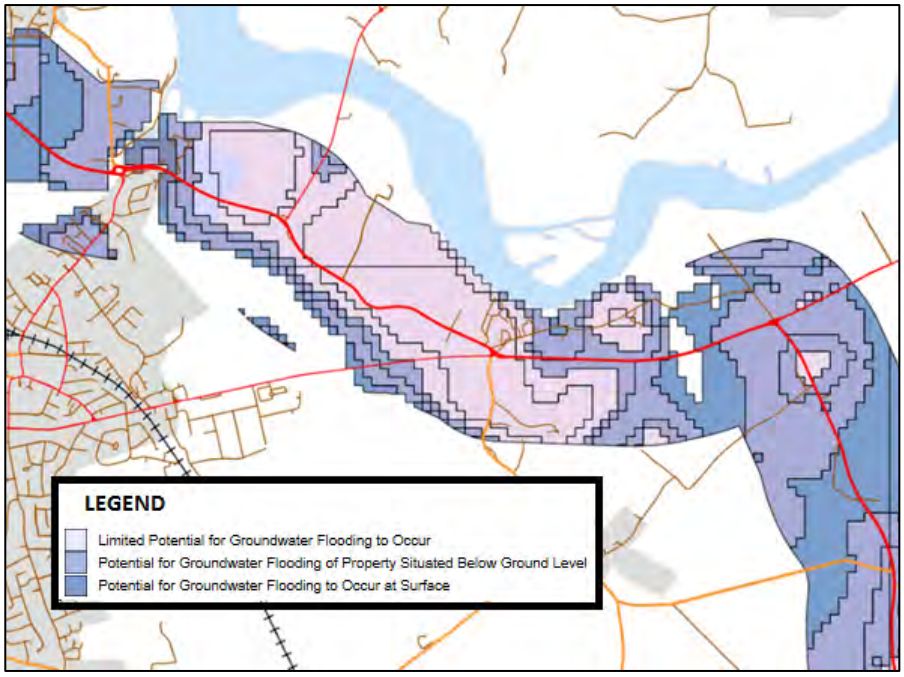


Figure 2-6: EA Source Protection Zone Mapping (not to scale)

2.7.10 The Stage 2 ground investigation data is limited, and as a result, further ground investigation works have been undertaken at Stage 3 to inform the preliminary design.

2.8 Geology

2.8.1 A review of the geology in the scheme area has identified that the bypass crosses agricultural land that is classified as Grade 2 in the Agricultural Land Classification system. The geology underlying the options comprises glacial till and tidal flat deposits (predominantly clay and silt) underlain by mudstone bedrock. These soils and rocks tend to have a low permeability that leads to the restriction of movement of contamination.

2.8.2 An overview of the drift geology can be seen in **Figure 2-7**:

Figure 2-7: Drift geology

2.8.3 Along the route of the proposed bypass, the ground conditions vary and, in summary – working from west to east, are:

- Amounderness Way west of Skippool Junction – artificial embankment on generally glacial till
- Skippool Junction to Main Dyke – River alluvium with soft marshy areas
- Bypass on embankment from Skippool Bridge Junction to Poulton Junction – along the interface between Glacial Till and River Alluvium comprising very soft ground
- Poulton Junction – interface between River Alluvium, Peat and Glacial sands and gravels
- East of Poulton Junction to Lodge Lane – bypass on embankment and then deep cutting mainly on Glacial Till
- East of Lodge Lane to Garstang New Road deep cutting through Glacial Till but also passing through a possible cap of glacial sands and gravels; and
- Garstang New Road to Windy Harbour Junction – Glacial Till but crossing an incursion of river alluvium about 0.5km west of Windy Harbour Junction.

2.9 Existing drainage catchments and discharge points

2.9.1 The desk top study of the as-built records, HADMMS and CCTV asset surveys have indicated a total of 19no. primary drainage catchments within the scheme limits.

2.9.2 The existing drainage catchments and their discharge points are shown on the Existing Drainage Catchments and Waterbodies plans provided in Appendix C

2.9.3 Table 2-1 lists the existing road drainage catchments and their discharge points:

Catchment ID	Location Description	Approximate Road Length (m)	Receiving Watercourse
1	Amounderness way to Skippool Junction	485	Horsebridge Dyke/ Skippool Creek
2	B5412 Skippool Road	60	Horsebridge Dyke/ Skippool Creek
3	A585 Break Road to Skippool Bridge	260	Main Dyke
4	Skippool Bridge to A585 Mains Lane	415	Main Dyke
5	A585 Mains Lane to A585 Shard Road	325	Unknown
6	A585 Shard Road	575	Unknown
7	A585 Shard Road to A585 Mains Lane	545	Unknown

Catchment ID	Location Description	Approximate Road Length (m)	Receiving Watercourse
8	A585 Mains Lane	400	Unknown
9	A585 Garstang New Road	710	Land ditch to River Wyre
10	A585 Garstang New Road	490	Land ditch to River Wyre
11	A585 Garstang New Road	780	Land ditch to River Wyre
12	A586 Garstang New Road East	530	Land ditch to Main Dyke
13	A586 Garstang New Road East	590	Main Dyke
14	B2560 Lodge Lane	210	Unknown
15	Pool Foot lane	80	Unknown
16	A4585 Shard Road	610	Land ditch to River Wyre
17	Old Mains Lane	38	Unknown
18	Skippool Junction	150	Horsebridge Dyke/ Skippool Creek
19	Skippool Junction	80	Horsebridge Dyke/ Skippool Creek

Table 2-1: Existing Drainage Catchments and Discharge points

2.9.4 A hydraulic modelling assessment of the existing drainage networks has been undertaken in Micro Drainage to determine existing discharge rates and the results are tabulated in Table 2-2. This assessment is based on the existing data available and will need to be updated and reviewed following receipt of the outstanding asset and condition survey data.

Catchment ID	Drainage Network Catchment Area (impermeable Catchment)	Calculated Existing Flow Rates in litres per second (1 in x year storm return period)		
(…)	(ha)	1 in 1 year	1 in 5 year	1 in 100 year
1	0.753	61.3	91.1	132.7
2	0.126	10.8	17.3	30.8
3	0.418	29.9	50.4	77.3
4	0.706	42.9	60.2	82.5
5	0.383	26.1	35.5	52.4
6	0.605	27.3	54.4	107.2
7	0.507	31.5	40	50.7
8	0.446	41.9	60.6	100.6
9	0.836	69.9	109	168.5
10	0.438	33	48.8	69.1
11	2.073	112.9	184.9	306.8
12	0.578	49.2	70.3	96.1
13	0.526	29.6	43.5	66.5
14	0.158	10.8	13.9	20.2
15	0.115	11.6	19.2	27.4
16	0.513	30.7	43.5	79.9
17	0.044	4.4	7.4	17.5
18	0.100	10.8	18	27.7
19	0.207	15.3	23.7	34.5

Table 2-2: Existing Drainage Catchment Areas and Discharge Rates

2.9.5 The existing highway drainage on the A585 route within the study area is predominantly by trapped gulley's or kerb off let gulley's connecting to carrier drains, with intermediate chambers, that discharge into field ditches or watercourses. In general, there are no specific measures to treat highway the larger discharges but some of the outfalls are provided with flap valves to prevent backflow of water from the larger watercourses.

2.9.6 The only exception to the above is the drainage network provided for the recently upgraded Windy Harbour Junction that uses combined kerb-drains that discharge to an oversized pipe that has been provided with a penstock valve and vortex flow control device at the outfall from this catchment.

2.9.7 The existing drainage networks are shown on the “Existing Drainage and Site Clearance” plans provided in Appendix D.

2.9.8 Highways England Operations Directorate Department did state that there could be existing surface water drains from the proposed de-trunked A585 that could cross the proposed offline bypass and they should be traced and the pipes protected and / or diverted to ensure their outfalls are maintained.

2.10 Condition of the existing drainage assets (stage 2 data)

2.10.1 A review of the available Stage 2 CCTV asset and condition data has been undertaken to confirm the condition of the existing drainage assets.

2.10.2 The review identified that CCTV asset and condition data is only available for the section of existing carriageway between Skippool Junction and Skippool Bridge and the available survey data is provided in Appendix A.

2.10.3 A review of this data has shown that there is current 1no. category 5 defect (collapsed pipe) and 6no. category 4 defects and 17no. “Survey abandoned” due to collapse, debris or loss of vision.

2.10.4 Further CCTV asset and condition data will be required to complete the stage 3 design, as discussed further in section 3.10.

2.11 Existing drainage design life

2.11.1 Limited as-built data is available and as a result the time of construction is difficult to confirm. However, the road wasn’t original constructed to DMRB standards and it’s difficult to confirm its residual life and has been subject to changes in the 1960’s and 1970’s before the road became a Trunk Road.

2.11.2 The DRMB states that the drainage assets have a design life of 60 years.

2.12 Flood hotspot summary

2.12.1 HADDMS has been reviewed for existing flooding incidents and “hotspots” along the existing A585 and at the tie-in location for the new offline bypass. 26 no. flood incidents between 2005 and 2015 have been identified with the scheme limits which include the existing A585 which will be de-trunked.

2.12.2 Extracts of maps identifying flood hotspot locations are given in Figure 2-8 to Figure 2-11 and a summary of details from HADDMS are provided in Tables Table 2-3 to Table 2-6.

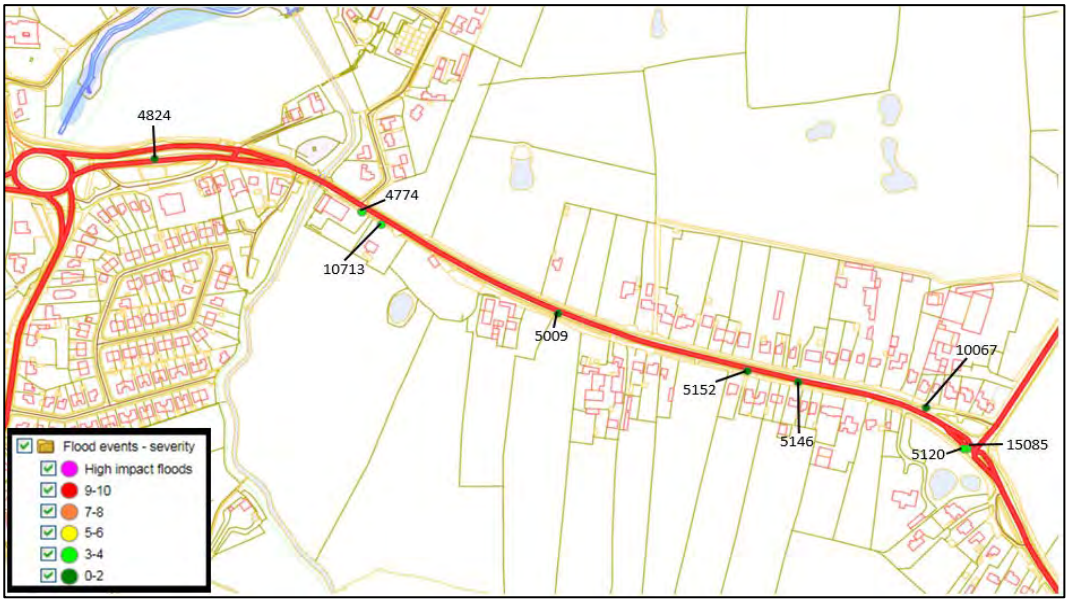


Figure 2-8: HADDMS Recorded Flood Incidents between Skippool Junction and Shard Road Junction (not to scale)

2.12.3 There are 9no. recorded flooding incidents between Skippool Junction and Shard Road as shown in Figure 2-8 and detailed in Table 2-3.

Flood ID	Date/Time Reported	Location (MP)		Description	Severity
		OS Easting	OS Northing		
4824	03/04/2006 14:54	335582	335582	Report of water on carriageway A585 Skip Pool - A585 Skip Pool by the ESSO garage	0.77
4774	21/10/2005 09:39	335798	440524	Report of 3 Blocked Gullies causing carriageway to flood - A585 Mains Lane adjacent to Shard Lane traffic signals Bet House No 137 and 139	2.94
10713	05/10/2012 15:45	335818	440510	water has been running off fields adjacent to carriageway. gullies unable to cope with volume of water following sustained period of heavy rainfall	2.52
5009	21/08/2008 05:43	336002	440413	Report of flooding - Between Singleton lights & Skippool roundabout	0.84
5152	06/01/2010 12:43	336199	440350	Blocked Drain - Outside 150 Mains Lane	0.76
5146	07/12/2009 14:59	336252	440338	Blocked drain causing flooding - Outside 150 Mains Lane	0.67
10067	11/05/2012 12:25	336385	440310	flooding	0.25
5120	08/10/2009 16:36	336424	440265	Blocked gullies - Shard Bridge Road	2.94
15085	28/03/2015 08:44	336428	440265	Flooding on carriageway due to partially blocked gullies and heavy rainfall.	3.53

Table 2-3:Flood Event Incident Records

2.12.4 The 9no. recorded incidents can be attributed to blocked gullies and pipe work and are all low risk.

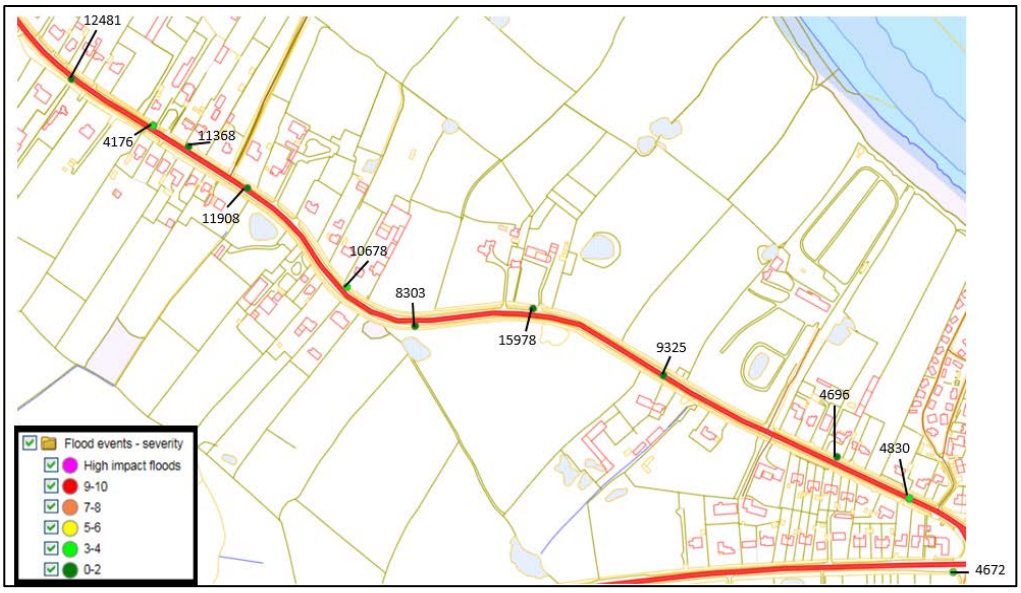


Figure 2-9: HADDMS Recorded Flood Incidents between Shard Road and Garstang Road East (not to scale)

2.12.5 There are 10no. recorded flooding incidents between Shard Road and Garstang Road as shown in Figure 2-9and detailed in Table 2-4.

Flood ID	Date/Time Reported	Location (MP)		Description	Severity
		OS Easting	OS Northing		
12481	09/09/2013 11:00	336591	440036	Small amount of flooding over the carriageway	0.67
4176	08/01/2007 12:21	336688	439982	Reporting further problems with blocked gully - Outside 60 Mains Lane, Little Singleton	3.53
11368	18/12/2012 13:46	336730	439958	Have come across flooding outside 84 Mains Lane. Flooding is across the footway and both carriageways and requires jetting.	0.25
11908	15/02/2013 11:55	336800	439910	water flowing from drain cover in footway. drain is part of c 'way drainage system. water flows at low pressure across footpath into c 'way channel	0.76
10678	01/09/2012 13:55	336918	439796	A585 - Approximately 15 metres of eastbound carriageway affected.	3.78
8303	11/08/2011 05:30	336999	439751	Flooding caused by numerous blocked gullies and exceptionally heavy rainfall	0.76
15978	18/11/2015 13:15	337139	439771	Received a call from a member of the public who reports flooding onto her property from the Mains Lane causing her electric gates to become faulty. Contacted Tony Peet who will attend.	1.12
9325	16/12/2011 11:52	337294	439694	Member of public reported flooding on his driveway due to a blocked drain on the footpath. Mains Lane, A585.	0.84
4696	22/10/2004 17:57	337500	439600	Callers Drive is flooded Due to water running down from the Carriageway - A585 outside Above Address	0.84
4830	23/05/2006 10:06	337586	439552	Report of a blocked gully A585 - A585 Mains Lane	2.94

Table 2-4: Flood Event Incident Records

2.12.6 The 10no. recorded incidents can be attributed to blocked gullies and pipe work and are all low risk.

Figure 2-10: HADDMS Recorded Flood Incidents between Garstang Road and the approach to Windy Harbour Junction (not to scale)

2.12.7 There are 2no. recorded flooding incidents between Garstang Road and the approach to Windy Harbour Junction as shown in Figure 2-10 and detailed in Table 2-5.

Flood ID	Date/Time Reported	Location (MP)		Description	Severity
		OS Easting	OS Northing		
4836	23/06/2006 11:27	337683	439469	Report of a Blocked Drain on the roundabout at River Wyre Hotel - A585 at roundabout at River Wyre Hotel opposite to Lamp column T369	2.94
4808	03/01/2006 08:02	337695	439463	Report of a blocked road drain on the Trunk Road A 585 at Little Singleton Poulton-le Fylde - A585 at Little Singleton Poulton-le Fylde	2.94

Table 2-5: Flood Event Incident Records

2.12.8 The 2no. recorded incidents can be attributed to blocked pipe work and are both low risks.

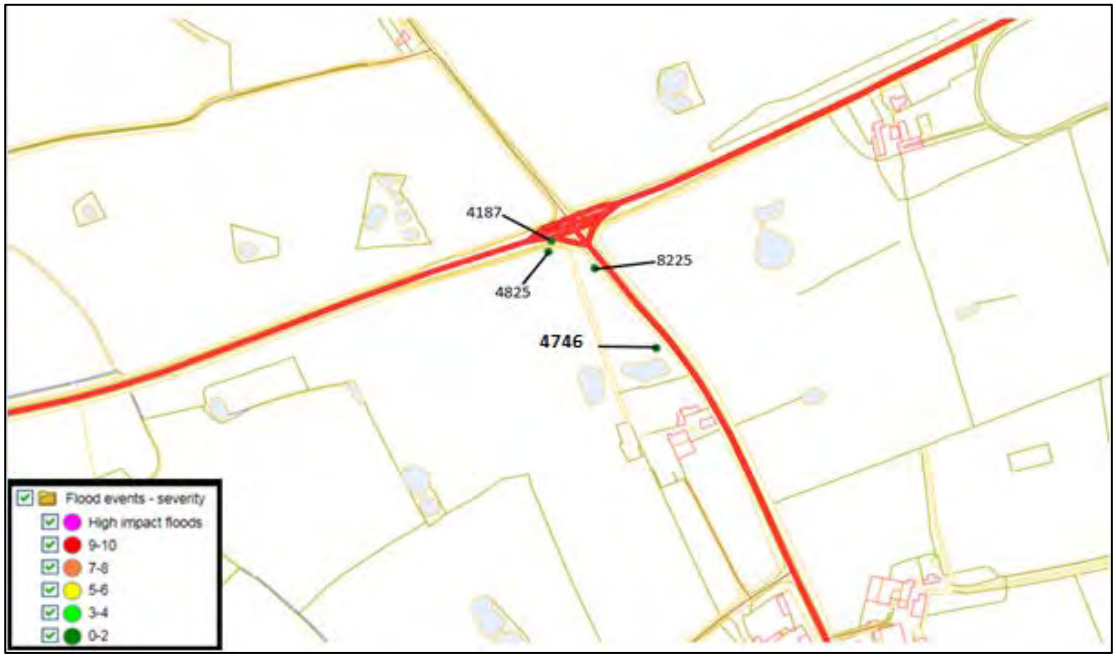


Figure 2-11: HADDMS Recorded Flood Incidents between Windy Harbour Junction and Fleetwood Road (not to scale)

2.12.9 There are 10no. recorded flooding incidents between the approach to Windy Harbour Junction and Fleetwood Road as shown in Figure 2-11 and detailed in Table 2-6.

Flood ID	Date/Time Reported	Location (MP)		Description	Severity
		OS Easting	OS Northing		
4825	13/04/2006 09:21	339300	439650	4 blocked gullies - A585 Mains Lane Jct Shard Rd	0.67
4187	11/11/2008 11:28	339303	439662	Blocked gullies overflowing - Mains Lane, Poulton-Le-Fylde	0.88
8255	04/08/2011 13:35	339348	439632	standing water in kerbside channel into live lane due to heavy rainfall. gullies clear	0.25
4746	20/04/2005 10:37	339412	439545	Caller is Reporting Blocked Drain looks like Bricks in it and is flooding his Yard - A585 Outside Callers Address Poulton le Fylde	0.84

Table 2-6: Flood Event Incident Records

2.12.10 The 4no. recorded incidents can be attributed to blocked gullies and pipe work and are all low risk.

2.13 Priority outfall summary

2.13.1 In 2000 Highways England investigated potentially polluting outfalls across its entire strategic road network. The outfalls were classified A to D according to their perceived risk, “A” being “Very High” and “D” being “Low” risk. Those outfalls classified as ‘A’ (very high risk) were labelled ‘Priority Outfalls’. A total of 10 no. outfalls location are recorded on the HADMMS as shown in Figure 2-12and Figure 2-13.

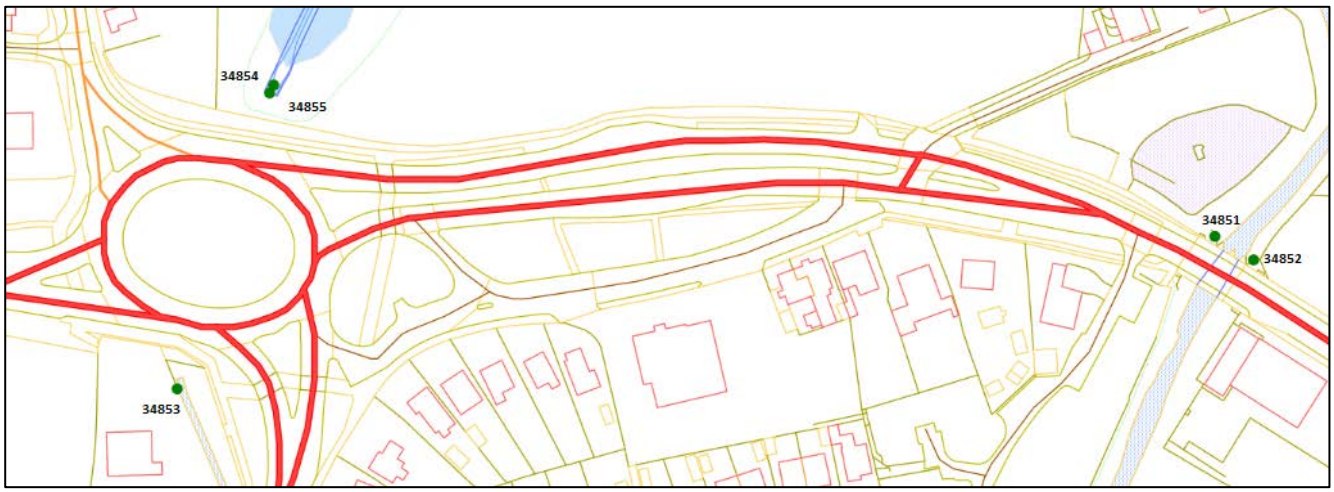


Figure 2-12: HADDMS Priority outfalls overall status between Skippool Junction and Skippool (not to scale)

2.13.2 5 no. outfalls have been identified between Skippool Junction and Skippool Bridge, all of which have an outfall overall status of “D” (low risk) and do not form part of the Priority Outfall Programme.

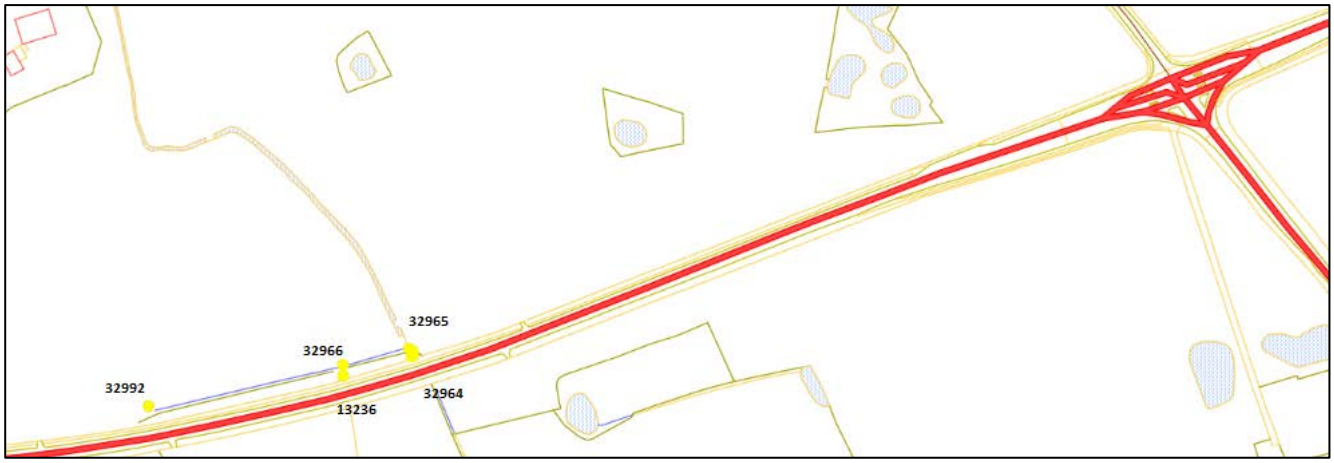


Figure 2-13: HADDMS Priority outfalls overall status between Garstang New Road and Windy Harbour Junction (not to scale)

2.13.3 5 no. outfalls have been identified between Garstang Road and Windy Harbour Junction, all of which have an outfall overall status of “C” (moderate risk) and do not form part of the Priority Outfall Programme.

2.13.4 An extract from the outfall register for each outfall can be found in Appendix E.

2.14 Priority culvert summary

2.14.1 Highways England also have a priority culverts register which identifies culverts under the road network that are undersized and could lead to flooding incidents during heavy rain. The culverts were classified A to D according to their perceived risk, “A” being “Very High” and “D” being “Low” risk.

2.14.2 One culvert has been identified with the scheme study area as shown in Figure 2-14 and it has been classified as low risk (classification D) as shown in Figure 2-15.

Figure 2-14: HADDMS Priority culvert overall status between Garstang New Road and Windy Harbour Junction (not to scale)

2.14.3 The register states that the culvert has no history of flooding and has a status “D” (low risk).

Culvert Register

Culvert Register ID	7584
HD43 asset ref	SD3839_8147a.1
Baseline category	D (Low)
Number of flood events	0-1
Flood severity	No history of flooding
Max impact	None
Verification status	Desk Study complete - no field study required
Action status	Not required
Overall risk status	X (Risk Addressed)
Proposed solution	Not required
Actual solution	Not required
Last updated	29/07/2011

Figure 2-15: HADDMS Priority culvert overall status register extract

2.14.4 The existing Skippool Clough Culvert is not classified as a drainage culvert on HADDMS but is recorded as a culvert in SMIS due to its internal diameter.

3 PROPOSED HIGHWAY DRAINAGE

3.1 The legal framework – flood risk

3.1.1 In England and Wales, the Environment Agency (EA) has a general supervisory role over all matters relating to land drainage and flood defence. Under the Land Drainage Act, there are two primary types of watercourse defined:

- Statutory Main River; and
- Ordinary Watercourses.

3.1.2 For 'Statutory Main River', the Environment Agency has powers under the Land Drainage Act and Water Recourses Act for flood defence purposes. For 'Ordinary Watercourses' the Local Authority has powers under the Land Drainage Act 1991 and local Land Drainage Byelaws to make riparian landowners manage watercourses appropriately. The relevant local authority is Lancashire County Council.

3.1.3 Highways England acting on behalf of the Secretary of State for Transport has the powers, under Section 100 of the Highways Act to discharge drainage from highways into any inland waters, whether natural or artificial, or any tidal waters (which includes groundwater). The powers relate only to drainage of the highway, which may be taken to include all land within the highway boundary.

3.2 The legal framework – water quality

3.2.1 The key piece of legislation with respect to the management of water resources and pollution control is the Water Framework Directive (WFD). The Directive was translated into English and Welsh law through The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, which came into force in January 2004.

3.2.2 The key objectives of the WFD is the provision of River Basin Management Plans (RBMPs), which aim to:

- Prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances;
- Protect, enhance and restore all bodies of groundwater, achieve good chemical and quantitative status of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment; and
- Preserve protected areas.

3.2.3 It requires that the water environment be looked at, integrating water quality, quantity and physical habitat with ecological indicators. Information gathered through the Environment Agency's monitoring programmes will allow the classification of surface water bodies into one of five WFD ecological status classes (High, Good, Moderate, Poor, Bad) and one of two chemical status classes (Pass/Fail).

3.2.4 One of the main goals of the Directive was to aim for at least 'good' ecological and 'good chemical status for surface waters, and 'good' chemical and 'good' quantitative status for groundwater by 2015.

3.2.5 The RBMPs are subject to a 6-yearly cycle. The first cycle of river basin planning ran from the publication of RBMPs in 2009 until 2015, the second cycle of river basin planning will run from 2015 until 2021. The Environment Agency submitted the proposed updated plans to ministers for approval on 30 October 2015, with publication due in early 2016.

3.2.6 The Environment Agency have released data they've collected for Cycle 2 and have published results for waterbodies.

3.2.7 The following watercourses are either near or cross the existing / proposed A585 are classified under WFD:

- River Wyre - Waterbody ID GB531207212200) Heavily Modified, transitional waterbody (estuarine). Overall ecological status of Moderate Potential, limited by some supporting elements/conditions, including dissolved inorganic nitrogen concentrations. Chemical status of Fail against the priority substances and priority hazardous substances categories;

- Horsebridge Dyke not monitored under the WFD, we are likely to infer quality based on data for the Main Dyke;
- Main Dyke - known as the Hillylaid Pool, (Waterbody ID GB112072066120) is classified as a heavily modified waterbody overall ecological status of Moderate Potential, no info provided in the River Basin Management Plan on limited factors. Good status regarding chemical quality; and
- Pool Foot Creek - not monitored under the WFD, need to infer water quality, consider it is likely to be of low quality as available dilution is limited.

3.2.8 Normally, consent from the Environment Agency (EA) under Section 88 of the Water Resources Act 1991 is required to discharge into controlled waters. Section 89(5) of that Act says, however, that a highway authority draining a highway under Section 100 powers will not be committing an offence if it does not have consent under Section 88.

3.2.9 The existing A585 was originally constructed prior to the Water Resources Act and there are no records of any formal Flood Defence consents.

3.2.10 Highways England acknowledges its obligation not to pollute and has provide guidance on the assessment and management of the impacts that the new construction, have on the water environment in HD45/09.

3.2.11 The issue of Pollution Control (Water Quality) and Accidental Spillage Containment is discussed further in Section 3.7.

3.3 Design standards

3.3.1 The stage 3 drainage design has been undertaken in accordance with standards, advice notes and IAN given in the Design Manual for Roads and Bridges (DMRB).

3.4 Design principles

3.4.1 The drainage system shall be able to rapidly remove water from the carriageway and prevent flooding of the carriageway for the design storm return periods.

3.4.2 The drainage system shall accommodate such run-off from the highway and from adjacent (external) catchments and increased rainfall intensities (related to predicted climate change effects), where possible, within the various constraints of the scheme design – in particular the land constraints.

3.4.3 Both with respect to water quality and discharge rates the aim of the design is, where possible, to:

- Achieve the required DMRB standards;
- Improve on the existing situation; and
- Improve on the ease of maintenance to provide a long-term improvement in highway water quality discharges.

3.4.4 The Environment Agency has indicated that it would like to see discharge rates reduced to those for “greenfield sites”.

3.5 Climate change

3.5.1 Guidance from HD33/16 states that an allowance for climate change should be incorporated into the design. To achieve he rainfall intensities used to calculate the design storms must include an allowance for the effects of climate change. Where rainfall data exclude such an allowance, a sensitivity test on the design of the drainage system must be carried out by increasing rainfall intensities of the design storm by 20% and adjustment made to the design should the initial design fail this sensitivity test.

3.5.2 The National Planning Policy Framework (NPPF) Table 5 of the Technical Guidance Note states that a scheme with a design life extending to a point earlier than 2085 should adopt a 20% allowance for climate change as shown in **Figure 3-1**:

Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall Intensity	*5%*	*10%*	*20%*	*30%*
Peak river flow	*10%*	*20%*		
Offshore wind speed	*5%*		*10%*	
Extreme wave height	*5%*		*10%*	

Figure 3-1: Table 5 extract from technical guidance note to NPPF (DCLG – 2012)

3.5.3 This Technical Guidance Note was withdrawn in March 2014 and replaced with a new guidance on flood risk assessment: climate change allowances and that the upper end allowance of 40% is now recommended, shown in Figure **3-2**2:

Table 2: peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Figure 3-2: Table 2 extract from flood risk assessment: climate change guidance

3.5.4 As the scheme has a design life extending to 2080 the design will be developed based on applying a 20% climate change allowance.

3.6 Water quality

3.6.1 As stated in Section 3.2 Highways England acknowledges its obligation not to pollute and the design will ensure that discharges from the carriageway will not lead to deterioration in the classification status of the receiving watercourses.

3.6.2 An assessment of the potential ecological impacts from the route runoff has been assessed using the Highways England Water Risk Assessment Tool (HAWRAT) to determine whether there is an environmental risk and if pollution mitigation measures need to be adopted.

3.6.3 The Environment Agency have approved the method of assessment used by HAWRAT and have agreed their output assessments can be used in eth Environmental Impact Assessment (EIA).

3.7 Pollution control

3.7.1 Spillages caused by accidents or other causes can occur anywhere on the road network and an assessment of the risk of acute pollution impact has been undertaken utilising Assessment Method D in HD45.

3.7.2 The proposed road catchment has been assessed, and targeted mitigation measures will be included in the design at high risk areas.

3.8 Consultations undertaken to inform the design

3.8.1 While investigating the existing drainage, and developing the Stage 3 drainage strategy for the scheme the following statutory consultees were contacted:

- Highways England Safety Engineering and Standards (S.E.S) Department
- Highways England Operations Directorate (O.D.) Department
- Environment Agency (EA)

- Lead Local Flood Authorities (LLFA's) – Lancashire County Council.

3.8.2 No non-statutory consultees have been contacted during the development of the Stage 3 drainage design.

3.8.3 Table 3-1show the liaison that has taken place to date:

ID	Stakeholder	Date	Comments
Stage 3 Design Consultation			
1	Highways England S.E.S Department	15/11/2017	Stage 3 design agreed in principle, close out 40% sensitivity allowance with Scheme Project Sponsor
2	Highways England O.D Department	16/11/2017	Stage 3 design agreed in principle
3	Environment Agency	Varies (email)	Stage 3 design discussed and request to design to DMRB and Ciria guidance confirmed.
4	Lancashire County Council	30/11/2017	Stage 3 – walk over survey
5	Lancashire County Council	28/11/2017 06/12/2017 11/01/2018 05/02/2018 (email)	Stage 3 – Email correspondence regarding setting up a drainage presentation – no response
6	Lancashire County Council	13/02/2018	Telephone to arrange meeting
7	Lancashire County Council	20-03-2018	Presentation to LCC
8	Environment Agency	30-04-2018	Introduction to the scheme

Table 3-1: Stage 3 Design consultation

3.8.4 Copies of the above correspondence, minutes of meetings and presentations can be found in Appendix F.

3.8.5 During consultation with Highways England S.E.S Department, the climate change allowance of 20% was raised and a requested was made to undertake a 40% sensitivity check on the design and the outcome reported back to them. They appreciated that the guidance in the DMRB was not clear regarding climate change.

3.8.6 Highways England confirmed that all edge drain details for collection of run off and carrier pipes/conduits for conveyance of that run off shall be designed based on the 'rainfall' experienced by the road catchment. River levels and sea levels are not part of this design consideration. However, all drainage design shall incorporate appropriate discharge controls to comply with the national requirements.

3.8.7 Highways England fully recognise the design standards described in the National Planning Policy Framework (NPPF) for climate change adaptation. NPPF provides the tools we need to ensure the SRN drainage network can be designed, constructed and operated in a safe way, and to meet our legal obligation not to increase the risk of flooding. All new schemes shall adopt the following approach to drainage design:

- For all new schemes that do not involve adaptation of an existing drainage network: Full compliance with the requirements described in NPPF
- For all new schemes that involve adaptation of an existing drainage network: Compliance in accordance with HD33, except for Smart Motorways where IAN 161 shall apply;
- In both 1 and 2, above, the design solution shall incorporate a 20% uplift in peak rainfall intensity. The proposal shall also sensitivity test the design with a 40% uplift in peak rainfall intensity. The difference between the 2 scenarios (Central and Upper) shall enable the end user to understand the range of impact between the climate change risk scenarios. In the light of this knowledge the Project Sponsor shall determine the appropriate course of action to be implemented
- For all schemes that use existing outfalls, the current discharge rates shall not be exceeded. The current discharge rates (no rates were historically pre-defined, or pre-agreed) shall be calculated using the current design methods available within DMRB 4.2
- All schemes shall be checked for a 1 in 100-year flooding compliance

3.8.8 For full details refer to the Minutes of Meeting (Document Number HE548643-ARC-HDG-A585-MM-Z-3008) in Appendix F.

3.8.9 During consultation with Lancashire County Council they confirmed that they agreed with our drainage proposals in principle.

3.9 Agreed design principles

3.9.1 Following discussions with Highways England S.E.S and O.D departments during Stage 3 design, it has been agreed with the Scheme Project Lead that the following drainage design principles be applied to the project:

- Draft drainage standards which are yet to be published shall be used in the design:
- Departures to maximise efficiency will be incorporated in the design;
- 40% climate allowance will be incorporated into the new offline bypass wetlands only and all other catchments will be designed to accommodate the 20% allowance; and
- Where existing outfalls are to be retained at the scheme tie-in locations the existing 1 in 5-year discharge rates with no allowance for climate change will be maintained. Attenuation will be provided to ensure these discharge rates are maintained and attenuation installed to accommodate the 1 in 5 years design storm only with a 1 in 100-year check undertaken.

3.10 Strategy for retaining the existing drainage

3.10.1 It is proposed to retain the existing drainage as part of the permanent works where it is not affected by the proposed highway works i.e. at tie-in locations and the sections of the existing A585 that will be de-trunked. The condition of this drainage will be reviewed, and remediation works will be carried out on category 4 and 5 defects within the scheme limits.

3.10.2 As stated in Section 2.10 data on the existing drainage is limited and a set of gap analysis plans have been produced to enable CCTV asset and condition data surveys to be undertaken to confirm the stage 3 existing drainage design. The stage 3 proposed drainage design utilises some of the existing drainage runs and outfalls and until the existing drainage pipe, line, level, diameters, condition and outfalls are confirmed, there is a risk that the stage 3 design will be needed to be revisited.

3.10.3 Currently it is proposed to retain sections of the existing drainage in catchment 1, 2, 3, 4, and 7 and the outfalls in catchment 2, 3, 7 and 9.

3.10.4 Minor modification works are required on the A588 Shard Road and at Little Singleton (Five Lane Ends) Junction.

3.11 Pre-earthworks drainage strategy

3.11.1 Surface water run-off from natural catchments drainage towards the proposed earthworks embankment shall be intercepted by cut-off ditches installed at the toe of the embankments. These ditches will be sufficiently deep to take the flow from the natural catchment and to intercept severed agricultural drainage systems.

3.11.2 Where existing watercourses or ditches will be severed by the proposed carriageway culvert will be installed to ensure water can flow from one side of the carriageway to the other.

3.11.3 There are currently 5no. new culverts (Culvert 1 to 5) proposed on the scheme and 2no. existing culverts (culvert 6 and 7) need to be extend due to widening of the existing carriageway west of Windy Harbour Junction. The location of these culverts can be seen on the Proposed Drainage Plans in Appendix G and size information is given in Table 3-2.

ID	Chainage (m)	Type (pipe / box)	Diameter (m)
Stage 3 Design Consultation			
1	1140	Pipe	1.5
2	1490	Pipe	1.5
3	1795	Pipe	1.5

ID	Chainage (m)	Type (pipe / box)	Diameter (m)
4	2005	Pipe	1.5
5	2490	Pipe	1.2
6	4300	Pipe	0.9
7	4350	Pipe	0.9

Table 3-2: Culverts Location and Size Information

3.11.4 Where proposed culvert has been installed some of the existing watercourse have been regraded.

3.11.5 Plan and sections for each culvert have been generated and can be seen in Appendix H.

3.11.6 The structural condition of the existing culverts (ID 6 and 7) is unknown, and as not surveyed as part of the drainage CCTV asset and condition surveys.

3.11.7 Skippool Clough Culvert is an existing culvert that carries Horsebridge Dyke under the A585 at Skippool roundabout. Horsebridge Dyke is defined by the Environment Agency as a "Main River". The culvert was originally constructed by Lancashire County Council in 1971 and was extended in 1980's. The culvert is formed from two distinct construction types. Due to the age, unknown condition and new carriageway being constructed above the culvert, it is proposed to replace the existing culvert. Refer to Structures Option Report for further details (document number: HE548643-ARC-GEN-A585-RP-S-3034).

3.12 Works within the floodplain

3.12.1 A section of the offline bypass is located within floodplain as per Section 2.6.

3.12.2 Wetlands 1 (catchment 4) is located within existing flood plain and have been designed to be above the proposed 1 in 100-year fluvial storm event which includes a 30% allowance for climate change. It was not possible to locate the wetland outside for the floodplain due to the low points of the proposed carriageway.

3.12.3 Wetlands 1 and 2 will be included in the Flood Risk Assessment and any detrimental effects mitigated.

3.12.4 At the time of writing this report the Flood Risk Assessment is being discussed with the EA ready for their approval.

3.13 Proposed drainage catchments

3.13.1 9no. proposed drainage catchments have been identified along the scheme length and can be seen on the Proposed Drainage Catchment Plan and Drainage Plans in Appendix G as mentioned in the next section.

3.14 Proposed drainage strategy – Catchments 1, 2 and 3

3.14.1 Catchment 1, 2 and 3 all discharge to existing watercourses utilising existing outfall discharge rates.

3.14.2 Catchment 1:

I. Starts approximately 200m (Chainage 0+000) west of the existing Skippool Junction and finishes at the centre of the junction (Chainage 0+340) and takes the north portion of the Junction and the B5412 Skippool Road;

II. The first 100m of existing drainage will be maintained following confirmation of its condition by CCTV asset and condition survey;

III. Surface water run-off will be removed from the carriageway using a combination of kerbs and gullies and combined kerb and drainage units;

IV. The surface water run-off will be conveyed to the outfall using a carrier pipe network;

V. A fin drain will be installed to drain the sub-grade drainage;

VI. As the existing Skippool Clough Culvert is to be replaced the existing highway drainage connection to the culvert will be abandoned and new highway drainage outfalls shall be provided on the downstream side of the new culvert. The new outlets through the headwall shall be fitted with flap valves as this section of the watercourse is tidal;

VII. The existing 1 in 5-year discharge rate to the existing Clough Culvert shall be provided by the proposed drainage network;

VIII. Attenuation in the form of oversized pipes has been provided to maintain the existing discharge rate while accommodating the additional paved area and 20% climate change allowance;

IX. A water quality assessment using HAWRAT show that pollution mitigation measures are not required (Refer to Appendix H for Method A and B calculations); and

X. An accident spillage risk assessment calculation for the catchment shows that the risk of a serious accidental pollution incident has a less than 1% probability of occurring, and as a result, no spillage control measure has been incorporated into the design (Refer to Appendix I for accidental spillage risk calculations).

3.14.3 Catchment 2:

I. Starts approximately 200m east (chainage 0+500) of the existing Skippool Junction and finishes at the centre of the junction (Chainage 0+340) and takes the southern portion of the Junction and Old Breck Road;

II. None of the existing drainage will be retained within this catchment, except for the existing outlet headwall into Horsebridge Dyke (subject to a pending condition survey);

III. Surface water run-off will be removed from the carriageway using a combination of kerbs and gullies and combined kerb and drainage units;

IV. The surface water run-off will be conveyed to the outfall using a carrier pipe network;

V. Combined Carrier filter pipes are proposed to drain the sub-grade drainage as well as surface runoff;

VI. It is proposed to maintain the existing discharge point to Horsebridge Dyke located on the A585 Breck Road south of the junction. At the time of writing this report it is assumed that the existing outlet headwall will need to be replaced with a new pre-cast headwall and flap value, as this asset has not been surveyed as part of the CCTV asset and condition survey;

VII. The existing 1 in 5-year discharge rate to the Skippool Clough Culvert will be maintained by the proposed drainage network;

XI. Attenuation in the form of oversized pipes has been provided to maintain the existing discharge rate while accommodating the additional paved area and 20% climate change allowance;

VIII. A water quality assessment using HAWRAT shows that pollution mitigation measures are not required (Refer to Appendix H for Method A and B calculations); and

IX. An accident spillage risk assessment calculation for the catchment shows that the risk of a serious accidental pollution incident has a less than 1% probability of occurring, and as a result, no spillage control measure has been incorporated into the design (Refer to Appendix I for accidental spillage risk calculations).

3.14.4 Catchment 3:

I. Starts approximately 200m east (chainage 0+400) of the existing Skippool Junction and finishes at 60m east of the A585 Mains Lane (Chainage 0+860) and the entire carriageway catchment and Old Mains Lane side road;

II. Approximately 100m of existing drainage is to be retained from the A585 Mains Lane and connected into the proposed drainage system;

III. Surface water run-off will be removed from the carriageway using a combination of kerbs and gullies and combined kerb and drainage units;

IV. The new eastbound and westbound Skippool Bridge will not require bridge deck drainage units as the surface water run-off flow width is maintained within the hard strip provided. Gullies have been provided upstream and downstream of the structures.

V. The surface water run-off will be conveyed to the outfall using a carrier pipe network;

VI. FIN drains will be installed to drain the sub-grade drainage;

VII. The existing outfalls to Main Dyke cannot be maintained due to the new northern bridge (eastbound carriageway). As a result, 2no. new outfalls to Main Dyke have been proposed. The new precast headwalls will incorporate flap valves as, although Main Dyke is not tidal, it is subject to changes is level due to the downstream Tidal Gate's flap valves;

XII. Attenuation in the form of oversized pipes has been provided to maintain the existing discharge rate while accommodating the additional paved area and 20% climate change allowance;

VIII. A water quality assessment using HAWRAT show that pollution mitigation measures are not required (Refer to Appendix H for Method A and B calculations); and

IX. An accident spillage risk assessment calculation for the catchment shows that the risk of a serious accidental pollution incident has a less than 1% probability of occurring, and as a result, no spillage control measure has been incorporated into the design (Refer to Appendix I for accidental spillage risk calculations).

3.15 Proposed drainage strategy – Catchments 4, 5, 6 and 7

3.15.1 Catchment 4, 5, 6 and 7 all discharge to receiving watercourse using a greenfield runoff rate of 11.9 litres per second per hectare which was calculated as part of the Flood Risk Assessment works.

3.15.2 Catchment 4:

I. Starts approximately 60m east of the A585 Mains Lane (Chainage 0+860 High point) and finishes east of the A586 Garstang Road East of Poulton Junction (Chainage 2+250). The low point of the road alignment is at Chainage 1+570;

II. The northern section of A586 Garstang Road East which will be connected to the new bypass through Poulton Junction. The existing gullies through the new junction will be abandoned and removed.

III. Surface water run-off from the offline bypass will be removed using Surface Water Channels (SWC). The SWC have a triangular profile and are 1.58m wide in the central reserve and 1.28m wide in the verge;

IV. Poulton Junction and the laybys utilise a combination of kerbs and gullies and combined kerb and drainage units to remove surface water run-off from the carriageway;

V. The surface water run-off will be conveyed to proposed Wetland no.1 using a carrier pipe network;

VI. Fin drain will be installed to drain the sub-grade drainage. Fin drains will be upgraded to narrow filter drains / filter drains to accommodate wide verges and earthworks run-off and groundwater flows. Where narrow filter drains / filter drains systems have been incorporated into the design to accommodate overland flow and groundwater, the systems have been kept separate from the surface water drainage systems and discharge directly into eth pre-earthworks ditches or watercourses;

VII. Wetland no.1 (Chainage 1+650) will provide attenuation to accommodate the 1 in 100-year storm return period with a 40% allowance for climate change, while maintaining the existing greenfield run-off rate;

VIII. Wetland 1 is located within Flood Zone 3 and forms part of the Flood Risk Assessment. To prevent the wetland being washed out, the access track around the pond has been set 300mm above the calculated 1 in 100-year fluvial storm event level as per HD45 and agreed with Highways England (refer to minutes in Appendix F);

IX. A wetland has been proposed as the water quality assessment using HAWRAT shows that pollution mitigation measures are required (Refer to Appendix H for Method A and B calculations); and

X. An accident spillage risk assessment calculation for the catchment show that the risk of a serious accidental pollution incident has a less than 1% probability (Refer to Appendix I for accidental spillage risk calculations). However, as this new catchment has a new wetland, the outlet headwall will incorporate an orifice plate built in to a penstock. The penstock will allow the wetland to be closed for maintenance activities and can be used for accidental spillage containment if needed.

3.15.3 Catchment 5:

I. Starts east of the A586 Garstang Road East Roundabout (Chainage 2+250) with a low point at Chainage 2+400 and finishes approximately 270m east of B5260 Lodge Lane (Chainage 3+400 – high point);

II. There are no existing drainage networks along the offline bypass;

XI. Surface water run-off from the offline bypass will be removed using Surface Water Channels (SWC). The SWC have a triangular profile and are 1.58m wide in the central reserve and 1.28m wide in the verge;

XII. The layby utilises a combination of kerbs and gullies and combined kerb and drainage units to remove surface water run-off from the carriageway;

III. The surface water run-off will be conveyed to proposed wetland no. 2 using a carrier pipe network;

IV. Filter drains will be installed to drain the sub-grade drainage. The fin drain will be upgraded to narrow filter drains / filter drains to accommodate wide verges, central reserve, earthworks run-off and groundwater flows. Where narrow filter drains / filter drains systems have been incorporated into the design to accommodate overland flow and groundwater, the systems have been kept separate from the surface water drainage systems and discharge directly into the pre-earthworks ditches or watercourses;

V. At Stage 2 there was an indication that the groundwater flows in Lodge Lane cutting could potentially have high flow rates due to the presence of glacial sand / gravel cap immediately east of Lodge Lane. There was also the possibility of artesian pressures in the Glacial Till that could be encountered when the cutting is constructed. Following receipt of Ground Investigation data at Stage 3 an analytical assessment of the flows for the entire 270m of the cutting has been undertaken based on dewatering of a 3m thick, fully saturated aquifer. The results for the 270m long cutting (the length that is below the water table) give a total flow of 7.5l/s. As a result, a separate filter drainage system has been provided to capture this potential groundwater flow. The filter drain system consists of 225mm diameter filter drain pipes located in the eastbound and westbound verge and low side of the central reserve. These filter drain have been set so that the top of the pipe is 1.6m below the finished road level to ensure that there is enough drawdown to prevent groundwater entering the carriageway foundation. The filter drains have been designed to cater for a ground water flow of 1.15x10-3 l/s/m;

VI. Wetland no.2 (Chainage 2+350) will provide attenuation to accommodate the 1 in 100-year storm return period with a 40% allowance for climate change, while maintaining the existing greenfield run-off rate;

VII. A wetland has been proposed as the water quality assessment using HAWRAT shows that pollution mitigation measures are required (Refer to Appendix H for Method A and B calculations); and

VIII. An accident spillage risk assessment calculation for the catchment show that the risk of a serious accidental pollution incident has a less than 1% probability (Refer to Appendix I for accidental spillage risk calculations). However, as this new catchment has a new wetland the outlet headwall will incorporate an orifice plate built in to a penstock. The penstock will allow the wetland to be closed to allow maintenance activities and can be used for accidental spillage containment if needed.

3.15.4 Catchment 6:

I. Starts approximately 270m east of B5260 Lodge Lane (Chainage 3+400) and finishes at the tie-in location to the existing A585 (Chainage 4+050);

II. Existing drainage along the existing Garstang New Road at chainage 4+050 will be retained and connected to proposed catchment.

III. Surface water run-off from the offline bypass will be removed using SWC. The SWC have a triangular profile and are 1.58m wide in the central reserve and 1.28m wide in the verge;

IV. The layby utilises a combination of kerbs and gullies and combined kerb and drainage units to

remove surface water run-off from the carriageway;

V. The surface water run-off will be conveyed to proposed Wetland no.3 using a carrier pipe network;

VI. Fin drains will be installed to drain the sub-grade drainage. The fin drain will be upgraded to narrow filter drains / filter drains to accommodate wide verges and central reserve;

VII. Wetland no.3 (Chainage 4+125) will provide attenuation to accommodate the 1 in 100-year storm return period with a 40% allowance for climate change, while maintaining the existing greenfield run-off rate;

VIII. A wetland has been proposed as the water quality assessment using HAWRAT shows that pollution mitigation measures are required (Refer to Appendix H for Method A and B calculations); and

IX. An accident spillage risk assessment calculation for the catchment show that the risk of a serious accidental pollution incident has a less than 1% probability (Refer to Appendix I for accidental spillage risk calculations). However, as this new catchment has a new wetland the outlet headwall will incorporate an orifice plate built in to a penstock. The penstock will allow the wetland to be closed to allow maintenance activities and can be used for accidental spillage containment if needed.

3.15.5 Catchment 7:

I. Starts at the tie-in location to the existing A585 (Chainage 4+050) and continues east towards Windy Harbour junction (Chainage 4+850 – high point). The existing A585 carriageway will become the new A585 eastbound carriageway and westbound carriageway will be completely new;

II. The existing drainage network of the recently upgraded Windy Harbour Junction (existing catchment 11) and its outfall is to be maintained, along with the eastbound drainage between Chainage4+570 and 4+860. However, a small section of the east drainage system will have to be revised between Chainage 4+400 and 4+580 and incorporated into catchment 7 to accommodate the additional paved area (0.45ha);

III. Surface water run-off from the carriageway will be removed using a SWC. The SWC have a triangular profile and are 1.58m wide in the central reserve and 1.28m wide in the verge;

IV. The existing drainage system (existing catchment 11) that is to be revised will remove surface water run-off from the eastbound carriageway using combined drainage and kerb units;

V. The surface water run-off will be conveyed to proposed wetland no. 4 using a carrier pipe network;

VI. A fin drain will be installed to drain the sub-grade of the carriageway and a filter drain will be installed to drain the verge and small cutting. As the filter is drainage a small area it will be connect to the drainage system prior to discharging to the outfall;

VII. Wetland no.4 (Chainage 4+460) will provide attenuation to accommodate the 1 in 100-year storm return period with a 40% allowance for climate change, while maintaining the existing greenfield run-off rate;

VIII. A wetland has been proposed as the water quality assessment using HAWRAT shows that pollution mitigation measures are required (Refer to Appendix H for Method A and B calculations); and

IX. An accident spillage risk assessment calculation for the catchment show that the risk of a serious accidental pollution incident has a less than 1% probability (Refer to Appendix I for accidental spillage risk calculations). However, as this new catchment has a new wetland the outlet headwall will incorporate an orifice plate built in to a penstock. The penstock will allow the wetland to be closed to allow maintenance activities and can be used for accidental spillage containment if needed.

3.16 Proposed drainage strategy – Catchment 8

3.16.1 Catchment 8 is split into 2no. proposed drainage networks. Catchment 8a which drains the northern section of Lodge Lane (B5260) up to the new proposed Lodge Lane Bridge, and Catchment 8b which drainages the proposed Lodge Lane Bridge and the southern length of carriageway that ties into the existing Lodge Lane. In the vicinity of the proposed bypass, Lodge Lane falls generally in a southerly direction.

3.16.2 Catchment 8a:

I. Starts at the existing highpoint on Lodge Lane (B5260) and north of the proposed Lodge Lane Bridge (60m from highpoint);

II. No drainage data is available for Lodge Lane (B5260) but road gullies have been noted along the road;

III. Surface water run-off from the carriageway will be removed using kerbs and gullies, which will discharge to a pre-earthworks ditch via a carrier pipe network;

IV. A water quality assessment using HAWRAT shows that pollution mitigation measures are not required (Refer to Appendix H for Method A and B calculations); and

V. An accident spillage risk assessment calculation for the catchment shows that the risk of a serious accidental pollution incident has a less than 1% probability of occurring, and as a result, no spillage control measure has been incorporated into the design (Refer to Appendix I for accidental spillage risk calculations).

3.16.3 Catchment 8b:

I. This proposed catchment will start at the north end of the proposed Lodge Lane bridge and continues to the tie-in with the existing carriageway which is approximately 100m south of the proposed Lodge Lane Bridge:

II. The proposed Lodge Lane Bridge (B5260) doesn't require drainage, due to the longitudinal fall;

III. Surface water run-off from the carriageway will be removed using kerbs and gullies, which will discharge to a pre-earthworks ditch via a carrier pipe network;

IV. A water quality assessment using HAWRAT shows that pollution mitigation measures are not required (Refer to Appendix H for Method A and B calculations); and

V. An accident spillage risk assessment calculation for the catchment shows that the risk of a serious accidental pollution incident has a less than 1% probability of occurring, and as a result, no spillage control measure has been incorporated into the design (Refer to Appendix I for accidental spillage risk calculations).

3.17 Proposed drainage strategy – Catchment 9

3.17.1 Catchment 9:

I. Starts west of Poulton Junction and finishes at the crossing with Main Dyke;

II. The existing drainage which ran from A586 Garstang Road East of Poulton Junction has been intercepted by catchment 4. The existing drainage along A586 Garstang Road East up to Main Dyke is to be abandoned and removed;

III. Surface water run-off from the carriageway will be removed using gullies;

IV. The surface water run-off will be conveyed to the outfall using a carrier pipe network;

V. Filter drains will be installed to drain the verge and small cutting. A small area of cutting will be drained to the carriageway drainage system prior to discharging to the outfall;

VI. The existing outfall to Main Dyke (north of the existing road crossing) is to be retained;

VII. A water quality assessment using HAWRAT show that pollution mitigation measures are not required (Refer to Appendix H for Method A and B calculations); and

VIII. An accident spillage risk assessment calculation for the catchment shows that the risk of a serious accidental pollution incident has a less than 1% probability of occurring, and as a result, no spillage control measure has been incorporated into the design (Refer to Appendix I for accidental spillage risk calculations).

3.18 Proposed drainage strategy – Catchment 10

3.18.1 Catchment 10 forms part of the existing Little Singleton junction and is a proposed drainage catchment which discharges to the existing drainage catchment 15:

I. Little Singleton Junction highway alignment has had minor modification to the junction to provide a U-turn arrangement east of the Junction;

II. The existing drainage has been modified to include new gullies to remove surface run-off from the carriageway;

III. The surface water run-off will be conveyed to the existing drainage networks using carrier pipes;

IV. At the time of writing this report HAWRAT and accidental spillage containment assessment had not been undertaken for this modification. However, due to the low traffic flows mitigation is not envisaged.

3.19 Proposed discharge rates

3.19.1 Hydraulic modelling of the proposed drainage networks has been completed for each catchment and a summary of the results can be seen in Table 3-3.

Catchment ID	Drainage Network Catchment Area (impermeable catchment)	Calculated Proposed Flow Rates in litres per second (1 in … year storm return period)		
(…)	(ha)	1 in 1 year	1 in 5 year	1 in 100 year
1	1.002	52.1	77.8	124
2	0.795	26.3	37.6	54.3
3	1.551	69	96.3	123.4
4	4.009	237.2	372.8	590.8
5	3.125	169.6	252.4	526
6	2.333	124.1	207.1	367.2
7	3.550	108.5	161.4	247.4
8a	0.042	5	8.3	15.7
8b	0.039	4.6	7.5	13.9
9	0.398	31.7	41.3	66.7

Table 3-3: Proposed catchment discharge rates

3.19.2 A summary of the discharge rate and the percentage difference when compared to the existing is given in Table 3-4:

Proposed		Existing		% Difference
Catchment ID	Calculated Flow Rates in litres per second (1 in 5-year storm return period)	Catchment ID	Calculated Flow Rates in litres per second (1 in 5-year storm return period)	
(…)		(…)		
1	77.8	1	91.1	14% less than existing
2	37.6	18	18	10% less than existing
		19	23.7	
3	96.3	3	50.4	13% less than existing
		4	60.2	
4	372.8	-	-	-
5	252.4	-	-	-
6	207.1	-	-	-
7	161.4	11	184.9	12.5% less than existing
8a	8.3	-	-	-
8b	7.5	-	-	-
9	41.3	13	43.5	5 % less than existing

Table 3-4: 1 in 5-year proposed discharge rates and % difference from existing

3.19.3 Proposed catchment 1, 2, 3, 7 and 9 outfall flow rates are less than the existing outfall rates of catchments.

3.20 Defects and remediation

3.20.1 As discussed in Section 2, there was very limited CCTV condition data available for the existing drainage on the A5036.

3.20.2 The drainage gap analysis plans include surveying the entire de-trunked section of the A585 to confirm the existing drainage asset locations and condition as there was no data available on HADMMS. This survey data would have confirmed the number of existing defects. As it is assumed that Lancashire County Council will want these defects remediating prior to accepting ownership of the de-trunked section of the A5036.

3.20.3 Highways England requested that the CCTV asset and condition survey was de-scoped in order to remove part of de-trucked section of the A585 due to additional data being made available by Highways England O.D. department. Refer to Appendix A for additional CCTV Data.

3.20.4 The data supplied showed that the surveys were undertaken in 2016 and the condition of the defects on the network may have changed in the last two years. As a result, it was agreed to de-scope the asset and condition works on the basis that the areas de-scoped could be surveyed at the detailed design stage.

3.20.5 The de-scoped CCTV asset and condition survey was received on 30/04/2018 and the design updated to reflect this survey information.

3.20.6 A review of the survey data confirmed that out of the 6.3km of existing pipework needing CCTV asset and condition survey and 2.5km requiring asset survey only (total of 9km), only 6.3km of data was received. This data was also made up of data outside of the scope of the works. For further details of the survey refer to Technical Note (TN22) – Drainage CCTV asset and condition survey review (document number: HE548643-ARC-HDG-A585-TN-D-3022) in Appendix J.

3.20.7 The outstanding survey data shall be included in the detailed design stage survey.

3.21 Off network access and future maintenance

3.21.1 Where possible, the design has sort to provide off network access for inspection and maintenance. Off network access has been provided for:

- Wetland 1 – To be accessed from the back of the proposed Lay-by; and
- Wetland 2 – To be accessed from the A586 Garstang Road East.

3.21.2 Wetlands 3 and 4 will need to be accessed directly from the offline bypass carriageway.

3.21.3 Vortex grit separators have been used in the design to replace the wetland sediment forebays as they provide a high level of sediment removal and use a very small plan area.

3.21.4 The ASC Area 13 currently do not have any vortex grit separators within their network and they have limited experience of maintaining the wetlands and they have requested training be provided on completion of the Scheme.

3.21.5 It was agreed with Highways England O.D Department that drainage training will be provided on completion of the works:

- Confined space training for operatives;
- Vortex grit separator inspection and maintenance training; and
- Wetland inspection and maintenance training.

3.21.6 This training will also include the creation of training videos for the operation, inspection and maintenance procedure for the following items;

- Penstock / orifice plates; and
- Vortex grit separators.

3.21.7 Pollution Control Device (PCD) signage in accordance with HD33/06 has been provide adjacent to:

- Hydrodynamic vortex grit separators;

- Penstock chambers and;
- Accidental spillage containment shut-off penstock.

3.21.8 A list of anticipated maintenance operations is presented in Appendix K.

3.22 Risk (Health and safety)

3.22.1 A Designer's Hazard Elimination Schedule (Document number: HE548643-ARC-GEN-A585-SC-PM-2006) has been carried out to identify risks that may be associated with the construction and maintenance of the new drainage systems to ensure that, wherever economically possible, hazards are eliminated, or the risks of hazards being encountered are identified, reduced and mitigated as appropriate.

3.22.2 As discussed in Section 2, due to the ages and fragmented nature of the existing drainage system, it is highly likely that the existing drainage assets will contain Asbestos Containing Materials (ACM's).

3.22.3 Highways England (Area 13) have provided their Asbestos Action Plan.

3.23 Buildability

3.23.1 The preliminary drainage design has sought to utilise modular construction materials to assist the installation of components to form larger units and to reduce the risk of injury whilst handling these items without the benefit of craneage. Products used in the detail design include:

- Twin wall thermoplastic pipes;
- Low capacity vortex grit separators;
- High capacity vortex grit separators;
- Composite orifice and penstocks;
- Concrete Storm water Cannel;
- Linear drainage channels; and
- Combined kerb and drain systems.

3.23.2 During the Stage 3 design, clash analysis has been undertaken utilising other disciplines 2D models. At the time of writing this report 3D models are being produced and further clash analysis and resolution will be undertaken.

3.24 Departures from standard

3.24.1 Elements of the design that do not comply with current design standards and advice given in the DMRB will be submitted to Highways England along with the justification for the departures and any appropriate mitigation measures provided.

3.24.2 At the time of writing this report the following departures have been discussed with Highways England S.E.S department:

- Increasing spacing for man access chambers from a maximum of 100m to 150m;
- Increasing the diameter of a Type 7 catch-pit from 1050m diameter to accommodate larger pipes; and
- 1 in 1 year surcharge of existing networks.

3.24.3 Highway England have confirmed that the departure listed above are common departures and in principle these will be approved. Refer to minute of meeting (Document number: HE548643-ARC-HDG-A585-MM-Z-3008-Highways England SES MoM) in Appendix F.

Appendix A – Existing CCTV asset and condition data

Defect No.	Survey No.	Start MH	Flow	End MH	m	Code	Description	Grade
1	4	MHA54	d/s	MHA33	5.7	SA	Survey abandoned, Remark: Unable to travel round bend	
2	5	MHA56	u/s	PN01	81.3	SA	Survey abandoned, Remark: To x-camera	
3	6	MHA56	u/s	PN02	42.9	SA	Survey abandoned, Remark: Extent of x-camera survey no.05	
4	7	MHA55	d/s	MHA54	62.9	SA	Survey abandoned, Remark: To x-camera	
5	8	MHA54	u/s	MHA55	21.3	SA	Survey abandoned, Remark: Extent of x-camera survey no.07	
6	32	MH09A	d/s	MH09	111.4	SA	Survey abandoned, Remark: To x-camera	
7	33	MH09	u/s	MH09A	10.69	SA	Survey abandoned, Remark: Extent of x-camera survey no.32	
8	34	MH11	d/s	MH09	70.7	SA	Survey abandoned, Remark: To x-camera	
9	35	MH11	u/s	MH13	31.1	SA	Survey abandoned, Remark: To x-camera	
10	36	MH19	d/s	MH15	78	SA	Survey abandoned, Remark: To x-camera	
11	43	NewMH01	u/s	RE02	15.9	SA	Survey abandoned, Remark: To x-camera	
12	44	RE02	d/s	NewMH01	70.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.43	
13	46	MH14	u/s	NewMH17	50.1	SA	Survey abandoned, Remark: To x-camera	
14	48	MH15	u/s	MH19	14.8	SA	Survey abandoned, Remark: Extent of x-camera survey no.36	
15	49	NewMH17	d/s	MH14	2	SA	Survey abandoned, Remark: Extent of x-camera survey no.46	
16	53	NewMH20	u/s	NewMH18	73.8	SA	Survey abandoned, Remark: To x-camera	
17	59	NewMH18	d/s	NewMH20	40.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.53	
18	61	MH09	u/s	MH11	51.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.34	
19	62	MH13	d/s	MH11	83	SA	Survey abandoned, Remark: Extent of x-camera survey no.35	
20	64	NewMH19	u/s	PN03	16.3	SA	Survey abandoned, Remark: Due to debris concrete	
21	65	NewMH19	d/s	PN04	32.9	SA	Survey abandoned, Remark: Joins main	

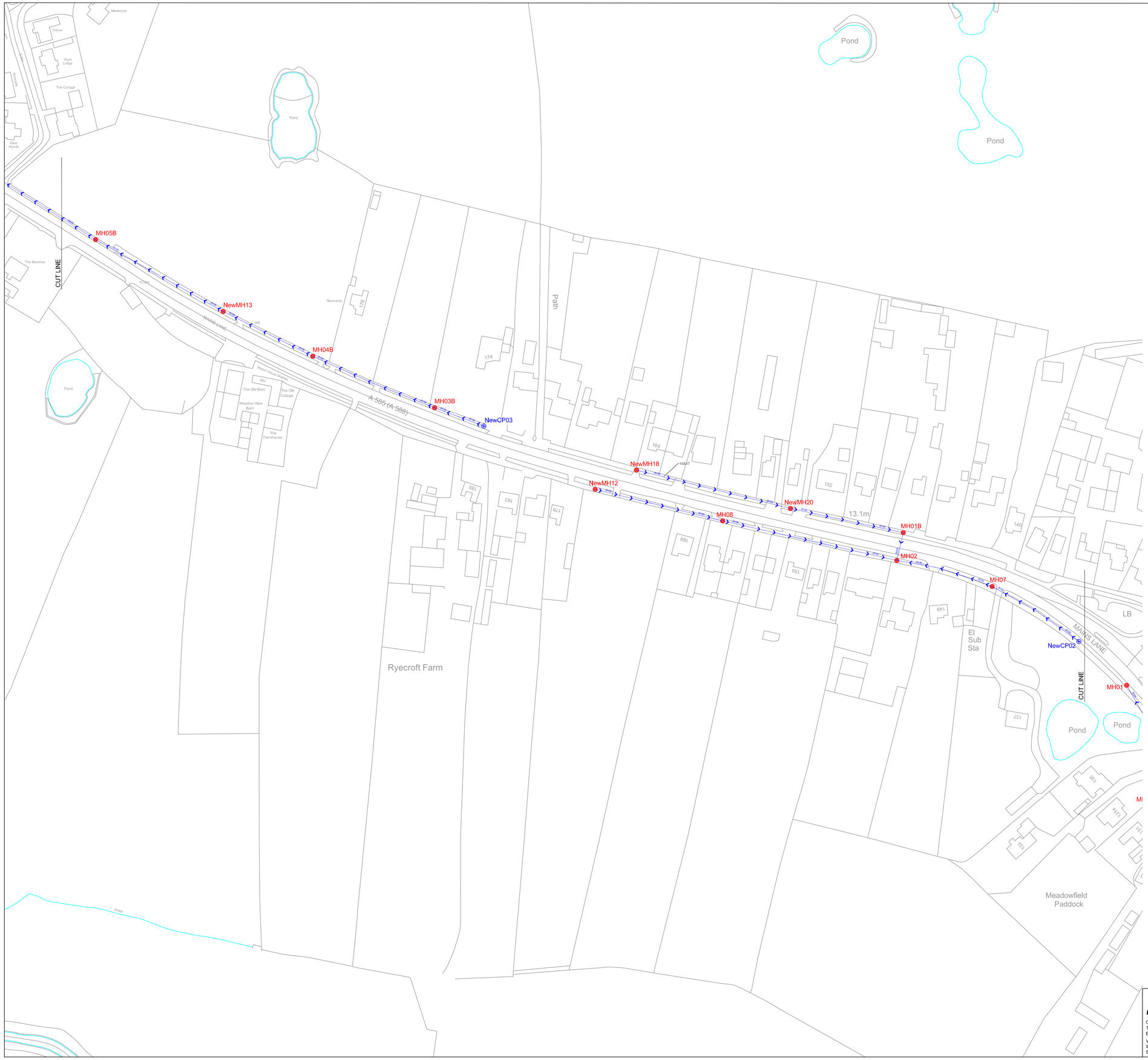
KEY

- CARRIER (SUB SURFACE CONT. ITEM)
- CARRIER ASSUMED (SUB SURFACE CONT. ITEM ASSUMED)
- SAFETY KERBS (SURFACE CONT. ITEM)
- FILTER/CARRIER (SUB SURFACE CONT. ITEM)
- FILTER/CARRIER ASSUMED (SUB FILTER/SURFACE CONT. ITEM ASSUMED)
- GRADE 4 DEFECT
- GRADE 5 DEFECT
- SURVEY ABANDONED DEFECT
- CATCHPIT (CP)
- CONNECTOR NODE
- GHOST NODE (GN)
- GULLY (GU)
- INSPECTION CHAMBER (IC)
- MANHOLE (MH)
- OIL INTERCEPTOR (OI)
- INLET
- OUTFALL (OU)
- OUTLET (OL)
- PHANTOM NODE (PN)
- RODDING EYE (RE)
- SILT INTERCEPTOR

ANDIDRAIN LIMITED
DRAIN CLEARANCE : SEWER SERVICES
Caron House, Kingmoor Park, Rockcliffe Estate, Rockcliffe, Carlisle, CA6 4RW
Tel : (01228) 672300 Fax : (01228) 672301
E-Mail : enquiries@andidrain.co.uk

Client :	METCALFE PLANT HIRE LTD
Drawing Title :	A585 MAINS LANE
Scale :	NTS
Revision :	
Drawn By :	S Atkinson
Revision date:	
Date :	16.11.2016
Description :	
Job No :	27207-01
Drg No :	1
Rev :	0

K:\CCTV Surveys\Metcalfe\A585 Mains Lane



Defect No.	Survey No.	Start MH	Flow	End MH	m	Code	Description	Grade
1	4	MHAS4	d/s	MHA33	5.7	SA	Survey abandoned, Remark: Unable to travel round bend	
2	5	MHAS6	u/s	PN01	81.3	SA	Survey abandoned, Remark: To x-camera	
3	6	MHAS6	u/s	PN02	42.9	SA	Survey abandoned, Remark: Extent of x-camera survey no.05	
4	7	MHAS5	d/s	MHAS4	62.9	SA	Survey abandoned, Remark: To x-camera	
5	8	MHAS4	u/s	MHAS5	21.3	SA	Survey abandoned, Remark: Extent of x-camera survey no.07	
6	32	MH09A	d/s	MH09	111.4	SA	Survey abandoned, Remark: To x-camera	
7	33	MH09	u/s	MH09A	10.69	SA	Survey abandoned, Remark: Extent of x-camera survey no.32	
8	34	MH11	d/s	MH09	70.7	SA	Survey abandoned, Remark: To x-camera	
9	35	MH11	u/s	MH13	31.1	SA	Survey abandoned, Remark: To x-camera	
10	36	MH19	d/s	MH15	78	SA	Survey abandoned, Remark: To x-camera	
11	43	NewMH01	u/s	RE02	15.9	SA	Survey abandoned, Remark: To x-camera	
12	44	RE02	d/s	NewMH01	70.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.43	
13	46	MH14	u/s	NewMH17	50.1	SA	Survey abandoned, Remark: To x-camera	
14	48	MH15	u/s	MH19	14.8	SA	Survey abandoned, Remark: Extent of x-camera survey no.36	
15	49	NewMH17	d/s	MH14	2	SA	Survey abandoned, Remark: Extent of x-camera survey no.46	
16	53	NewMH20	u/s	NewMH18	73.8	SA	Survey abandoned, Remark: To x-camera	
17	59	NewMH18	d/s	NewMH20	40.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.53	
18	61	MH09	u/s	MH11	51.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.34	
19	62	MH13	d/s	MH11	83	SA	Survey abandoned, Remark: Extent of x-camera survey no.35	
20	64	NewMH19	u/s	PN03	16.3	SA	Survey abandoned, Remark: Due to debris concrete	
21	65	NewMH19	d/s	PN04	32.9	SA	Survey abandoned, Remark: Joins main	

KEY

- CARRIER (SUB SURFACE CONT. ITEM)
- CARRIER ASSUMED (SUB SURFACE CONT. ITEM ASSUMED)
- SAFETY KERBS (SURFACE CONT. ITEM)
- FILTER/CARRIER (SUB SURFACE CONT. ITEM)
- FILTER/CARRIER ASSUMED (SUB FILTER/SURFACE CONT. ITEM ASSUMED)
- GRADE 4 DEFECT
- GRADE 5 DEFECT
- SURVEY ABANDONED DEFECT
- CATCHPIT (CP)
- CONNECTOR NODE
- GHOST NODE (GN)
- GULLY (GU)
- INSPECTION CHAMBER (IC)
- MANHOLE (MH)
- OIL INTERCEPTOR (OI)
- INLET
- OUTFALL (OU)
- OUTLET (OL)
- PHANTOM NODE (PN)
- RODDING EYE (RE)
- SILT INTERCEPTOR

ANDIDRAIN LIMITED
DRAIN CLEARANCE : SEWER SERVICES
Caron House, Kingmoor Park, Rockcliffe Estate, Rockcliffe, Carlisle, CA6 4RW
Tel : (01228) 672300 Fax : (01228) 672301
E-Mail : enquiries@andidrain.co.uk

Client :	METCALFE PLANT HIRE LTD		
Drawing Title :	A585 MAINS LANE		
Scale :	NTS	Revision :	
Drawn By :	S Atkinson	Revision date:	
Date :	16.11.2016	Description :	
Job No :	27207-01	Drg No : 2	Rev : 0

K:\CCTV Surveys\Metcalfe\A585 Mains Lane

Defect No.	Survey No.	Start MH	Flow	End MH	m	Code	Description	Grade
1	4	MHAS4	d/s	MHA33	5.7	SA	Survey abandoned, Remark: Unable to travel round bend	
2	5	MHAS6	u/s	PNO1	81.3	SA	Survey abandoned, Remark: To x-camera	
3	6	MHAS6	u/s	PN02	42.9	SA	Survey abandoned, Remark: Extent of x-camera survey no.05	
4	7	MHAS5	d/s	MHAS4	62.9	SA	Survey abandoned, Remark: To x-camera	
5	8	MHAS4	u/s	MHAS5	21.3	SA	Survey abandoned, Remark: Extent of x-camera survey no.07	
6	32	MH09A	d/s	MH09	111.4	SA	Survey abandoned, Remark: To x-camera	
7	33	MH09	u/s	MH09A	10.69	SA	Survey abandoned, Remark: Extent of x-camera survey no.32	
8	34	MH11	d/s	MH09	70.7	SA	Survey abandoned, Remark: To x-camera	
9	35	MH11	u/s	MH13	31.1	SA	Survey abandoned, Remark: To x-camera	
10	36	MH19	d/s	MH15	78	SA	Survey abandoned, Remark: To x-camera	
11	43	NewMH01	u/s	RE02	15.9	SA	Survey abandoned, Remark: To x-camera	
12	44	RE02	d/s	NewMH01	70.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.43	
13	46	MH14	u/s	NewMH17	50.1	SA	Survey abandoned, Remark: To x-camera	
14	48	MH15	u/s	MH19	14.8	SA	Survey abandoned, Remark: Extent of x-camera survey no.36	
15	49	NewMH17	d/s	MH14	2	SA	Survey abandoned, Remark: Extent of x-camera survey no.46	
16	53	NewMH20	u/s	NewMH18	73.8	SA	Survey abandoned, Remark: To x-camera	
17	59	NewMH18	d/s	NewMH20	40.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.53	
18	61	MH09	u/s	MH11	51.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.34	
19	62	MH13	d/s	MH11	83	SA	Survey abandoned, Remark: Extent of x-camera survey no.35	
20	64	NewMH19	u/s	PN03	16.3	SA	Survey abandoned, Remark: Due to debris concrete	
21	65	NewMH19	d/s	PN04	32.9	SA	Survey abandoned, Remark: Joins main	

Brownlea Farm
Pond
Pond
Pond
Pond
LB
MAINS LANE
A 585
NewCP02
MH01
CUT LINE
13.4m
Pond
Pond
TCB
MH04
NewMH11
MH09B
GP
GU16
NewCP04
Meadowfield Paddock
MH09A
Pond
13.7m
Little Singleton
MH09
MH10
A 585
A 585
MH11
MH12
BM 15.72m
14.3m
BM 15.01m
Red Trees Nursery
Burtonwood Nurseries
MH13
NewMH10
CUT LINE
MAINS LANE
Pond
Pond
Pond
Pond
Pond
The Cottage
Drain
Drain
Pond
Little Singleton

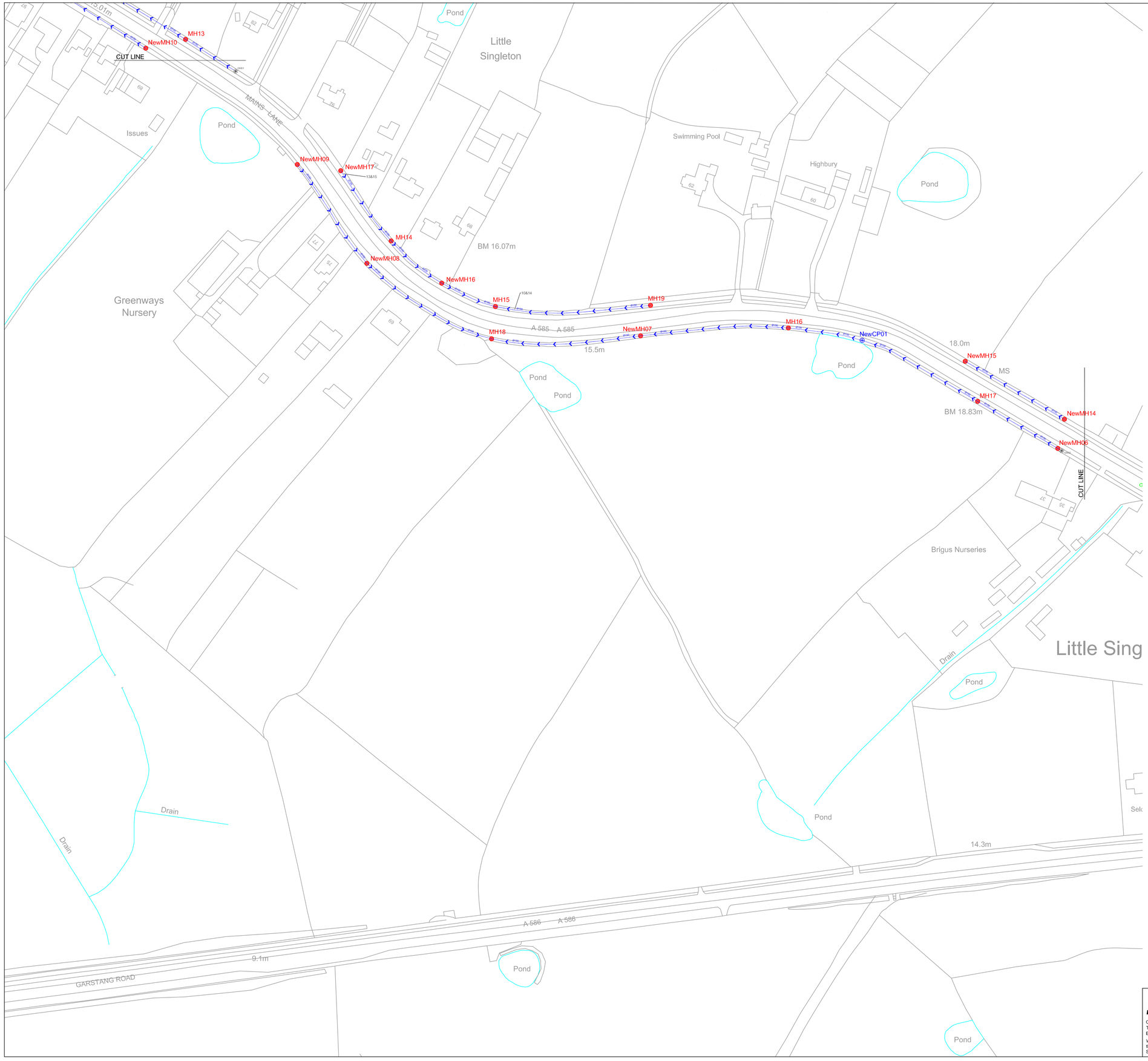
KEY

- CARRIER (SUB SURFACE CONT. ITEM)
- CARRIER ASSUMED (SUB SURFACE CONT. ITEM ASSUMED)
- SAFETY KERBS (SURFACE CONT. ITEM)
- FILTER/CARRIER (SUB SURFACE CONT. ITEM)
- FILTER/CARRIER ASSUMED (SUB FILTER/SURFACE CONT. ITEM ASSUMED)
- GRADE 4 DEFECT
- GRADE 5 DEFECT
- SURVEY ABANDONED DEFECT
- CATCHPIT (CP)
- CONNECTOR NODE
- GHOST NODE (GN)
- GULLY (GU)
- INSPECTION CHAMBER (IC)
- MANHOLE (MH)
- OIL INTERCEPTOR (OI)
- INLET
- OUTFALL (OU)
- OUTLET (OL)
- PHANTOM NODE (PN)
- RODDING EYE (RE)
- SILT INTERCEPTOR

ANDIDRAIN LIMITED
DRAIN CLEARANCE : SEWER SERVICES
Caron House, Kingmoor Park, Rockcliffe Estate, Rockcliffe, Carlisle, CA6 4RW
Tel : (01228) 672300 Fax : (01228) 672301
E-Mail : enquiries@andidrain.co.uk

Client :	METCALFE PLANT HIRE LTD		
Drawing Title :	A585 MAINS LANE		
Scale :	NTS	Revision :	
Drawn By :	S Atkinson	Revision date:	
Date :	16.11.2016	Description :	
Job No :	27207-01	Drg No : 3	Rev : 0

K:\CCTV Surveys\Metcalfe\A585 Mains Lane



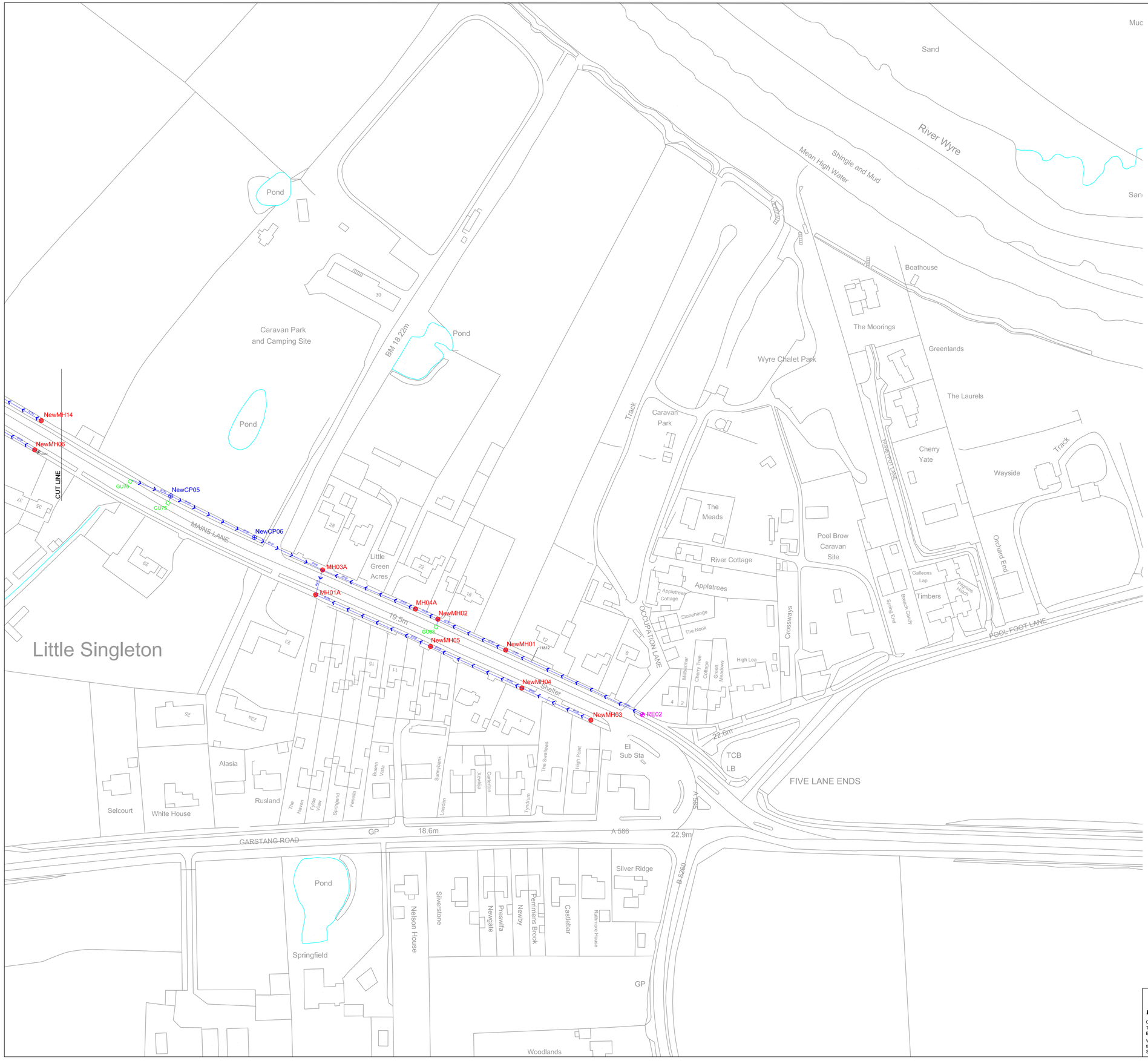
Defect No.	Survey No.	Start MH	Flow	End MH	m	Code	Description	Grade
1	4	MHAS4	d/s	MHA33	5.7	SA	Survey abandoned, Remark: Unable to travel round bend	
2	5	MHAS6	u/s	PN01	81.3	SA	Survey abandoned, Remark: To x-camera	
3	6	MHAS6	u/s	PN02	42.9	SA	Survey abandoned, Remark: Extent of x-camera survey no.05	
4	7	MHAS5	d/s	MHAS4	62.9	SA	Survey abandoned, Remark: To x-camera	
5	8	MHAS4	u/s	MHAS5	21.3	SA	Survey abandoned, Remark: Extent of x-camera survey no.07	
6	32	MH09A	d/s	MH09	111.4	SA	Survey abandoned, Remark: To x-camera	
7	33	MH09	u/s	MH09A	10.69	SA	Survey abandoned, Remark: Extent of x-camera survey no.32	
8	34	MH11	d/s	MH09	70.7	SA	Survey abandoned, Remark: To x-camera	
9	35	MH11	u/s	MH13	31.1	SA	Survey abandoned, Remark: To x-camera	
10	36	MH19	d/s	MH15	78	SA	Survey abandoned, Remark: To x-camera	
11	43	NewMH01	u/s	RE02	15.9	SA	Survey abandoned, Remark: To x-camera	
12	44	RE02	d/s	NewMH01	70.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.43	
13	46	MH14	u/s	NewMH17	50.1	SA	Survey abandoned, Remark: To x-camera	
14	48	MH15	u/s	MH19	14.8	SA	Survey abandoned, Remark: Extent of x-camera survey no.36	
15	49	NewMH17	d/s	MH14	2	SA	Survey abandoned, Remark: Extent of x-camera survey no.46	
16	53	NewMH20	u/s	NewMH18	73.8	SA	Survey abandoned, Remark: To x-camera	
17	59	NewMH18	d/s	NewMH20	40.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.53	
18	61	MH09	u/s	MH11	51.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.34	
19	62	MH13	d/s	MH11	83	SA	Survey abandoned, Remark: Extent of x-camera survey no.35	
20	64	NewMH19	u/s	PN03	16.3	SA	Survey abandoned, Remark: Due to debris concrete	
21	65	NewMH19	d/s	PN04	32.9	SA	Survey abandoned, Remark: Joins main	

KEY

- CARRIER (SUB SURFACE CONT. ITEM)
- CARRIER ASSUMED (SUB SURFACE CONT. ITEM ASSUMED)
- SAFETY KERBS (SURFACE CONT. ITEM)
- FILTER/CARRIER (SUB SURFACE CONT. ITEM)
- FILTER/CARRIER ASSUMED (SUB FILTER/SURFACE CONT. ITEM ASSUMED)
- GRADE 4 DEFECT
- GRADE 5 DEFECT
- SURVEY ABANDONED DEFECT
- CATCHPIT (CP)
- CONNECTOR NODE
- GHOST NODE (GN)
- GULLY (GU)
- INSPECTION CHAMBER (IC)
- MANHOLE (MH)
- OIL INTERCEPTOR (OI)
- INLET
- OUTFALL (OU)
- OUTLET (OL)
- PHANTOM NODE (PN)
- RODDING EYE (RE)
- SILT INTERCEPTOR

ANDIDRAIN LIMITED
DRAIN CLEARANCE : SEWER SERVICES
Caron House, Kingmoor Park, Rockcliffe Estate, Rockcliffe, Carlisle, CA6 4RW
Tel : (01228) 672300 Fax : (01228) 672301
E-Mail : enquiries@andidrain.co.uk

Client :	METCALFE PLANT HIRE LTD		
Drawing Title :	A585 MAINS LANE		
Scale :	NTS	Revision :	
Drawn By :	S Atkinson	Revision date:	
Date :	16.11.2016	Description :	
Job No :	27207-01	Drg No : 4	Rev : 0



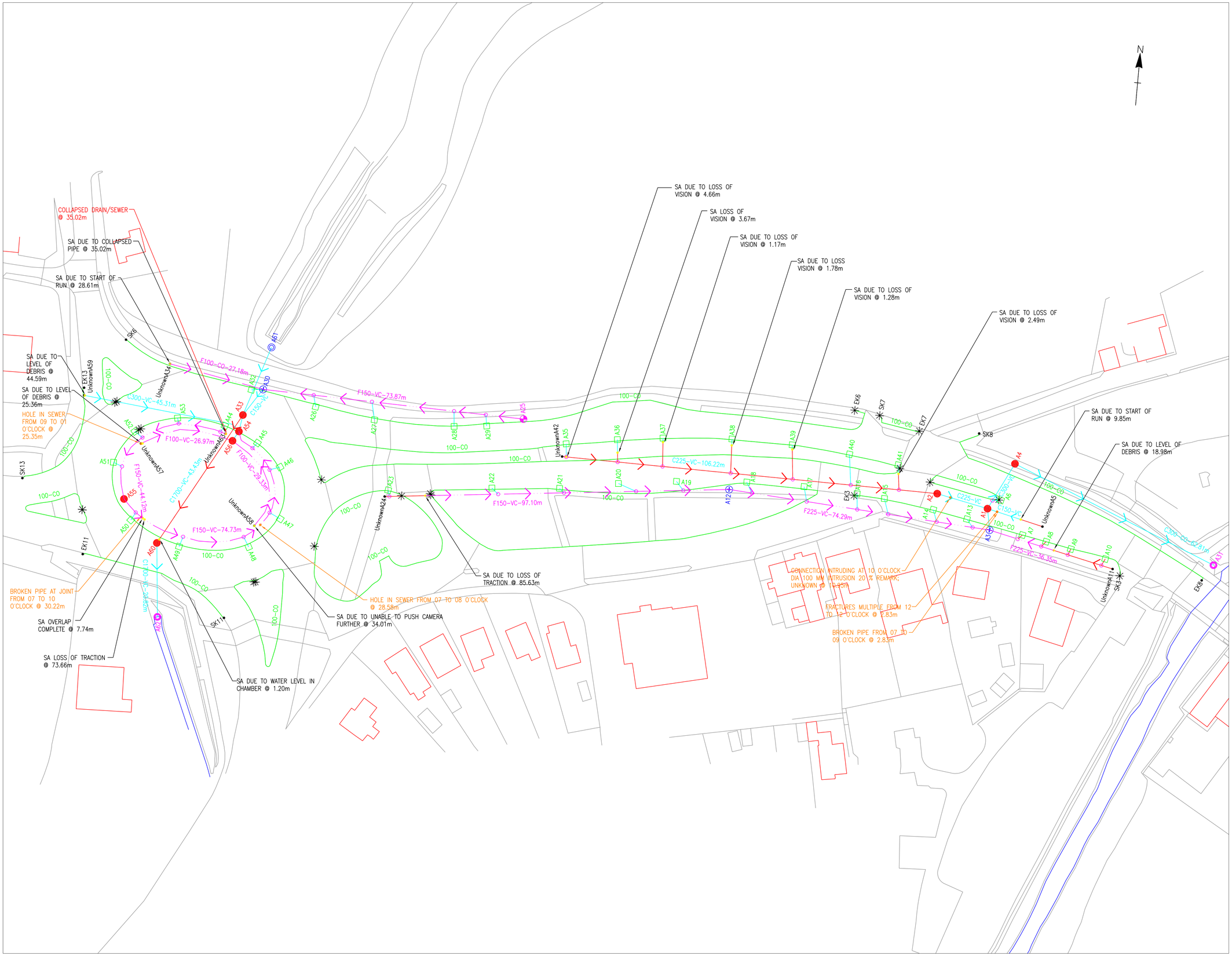
Defect No.	Survey No.	Start MH	Flow	End MH	m	Code	Description	Grade
1	4	MHAS4	d/s	MHA33	5.7	SA	Survey abandoned, Remark: Unable to travel round bend	
2	5	MHAS6	u/s	PN01	81.3	SA	Survey abandoned, Remark: To x-camera	
3	6	MHAS6	u/s	PN02	42.9	SA	Survey abandoned, Remark: Extent of x-camera survey no.05	
4	7	MHAS5	d/s	MHAS4	62.9	SA	Survey abandoned, Remark: To x-camera	
5	8	MHAS4	u/s	MHAS5	21.3	SA	Survey abandoned, Remark: Extent of x-camera survey no.07	
6	32	MH09A	d/s	MH09	111.4	SA	Survey abandoned, Remark: To x-camera	
7	33	MH09	u/s	MH09A	10.69	SA	Survey abandoned, Remark: Extent of x-camera survey no.32	
8	34	MH11	d/s	MH09	70.7	SA	Survey abandoned, Remark: To x-camera	
9	35	MH11	u/s	MH13	31.1	SA	Survey abandoned, Remark: To x-camera	
10	36	MH19	d/s	MH15	78	SA	Survey abandoned, Remark: To x-camera	
11	43	NewMH01	u/s	RE02	15.9	SA	Survey abandoned, Remark: To x-camera	
12	44	RE02	d/s	NewMH01	70.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.43	
13	46	MH14	u/s	NewMH17	50.1	SA	Survey abandoned, Remark: To x-camera	
14	48	MH15	u/s	MH19	14.8	SA	Survey abandoned, Remark: Extent of x-camera survey no.36	
15	49	NewMH17	d/s	MH14	2	SA	Survey abandoned, Remark: Extent of x-camera survey no.46	
16	53	NewMH20	u/s	NewMH18	73.8	SA	Survey abandoned, Remark: To x-camera	
17	59	NewMH18	d/s	NewMH20	40.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.53	
18	61	MH09	u/s	MH11	51.7	SA	Survey abandoned, Remark: Extent of x-camera survey no.34	
19	62	MH13	d/s	MH11	83	SA	Survey abandoned, Remark: Extent of x-camera survey no.35	
20	64	NewMH19	u/s	PN03	16.3	SA	Survey abandoned, Remark: Due to debris concrete	
21	65	NewMH19	d/s	PN04	32.9	SA	Survey abandoned, Remark: Joins main	

KEY

- CARRIER (SUB SURFACE CONT. ITEM)
- CARRIER ASSUMED (SUB SURFACE CONT. ITEM ASSUMED)
- SAFETY KERBS (SURFACE CONT. ITEM)
- FILTER/CARRIER (SUB SURFACE CONT. ITEM)
- FILTER/CARRIER ASSUMED (SUB FILTER/SURFACE CONT. ITEM ASSUMED)
- GRADE 4 DEFECT
- GRADE 5 DEFECT
- SURVEY ABANDONED DEFECT
- CATCHPIT (CP)
- CONNECTOR NODE
- GHOST NODE (GN)
- GULLY (GU)
- INSPECTION CHAMBER (IC)
- MANHOLE (MH)
- OIL INTERCEPTOR (OI)
- INLET
- OUTFALL (OU)
- OUTLET (OL)
- PHANTOM NODE (PN)
- RODDING EYE (RE)
- SILT INTERCEPTOR

ANDIDRAIN LIMITED
DRAIN CLEARANCE : SEWER SERVICES
Caron House, Kingmoor Park, Rockcliffe Estate, Rockcliffe, Carlisle, CA6 4RW
Tel : (01228) 672300 Fax : (01228) 672301
E-Mail : enquiries@andidrain.co.uk

Client :	METCALFE PLANT HIRE LTD
Drawing Title :	A585 MAINS LANE
Scale :	NTS
Revision :	
Drawn By :	S Atkinson
Revision date:	
Date :	16.11.2016
Description :	
Job No :	27207-01
Drg No :	5
Rev :	0



SYMBOLOGY:

- SUB SURFACE CONTINUOUS ITEMS
- SUB SURFACE CONTINUOUS ITEMS UNSURVEYED
- COMBINED SURFACE AND SUB SURFACE ITEMS
- COMBINED SURFACE AND SUB SURFACE ITEMS UNSURVEYED
- SURFACE CONTINUOUS ITEMS
- PHANTOM CONNECTOR

SYMBOLS:

- MANHOLE
- OUTFALL
- OUTLET
- INLET
- PUMPING STATION
- GULLY
- GRIP INLET
- SOAKAWAY
- OIL INTERCEPTOR
- SILT INTERCEPTOR
- CATCHPIT
- GHOST NODE
- PHANTOM NODE
- RODDING EYE
- OTHER SPECIAL CHAMBER
- CONNECTOR NODE
- MARKER POST REF

PIPE (e.g F=FILTER, C=CARRIER PIPES)
DIAMETER
MATERIAL
PIPE LENGTH (m)
C300-CO-100.000

DEFECT SYMBOLS

- LOCATION OF GRADE 4 DEFECTS
- LOCATION OF GRADE 5 DEFECTS
- LOCATION OF SURVEY ABANDONED

NOTE:
GPS CHAMBERS / GULLY'S etc ARE SHOWN AS CO-ORDINATES AND MAY APPEAR TO BE IN CONFLICT WITH THEIR ACTUAL POSITION IN RELATION TO THE CARRIAGEWAY MARKINGS GIVEN

Rev	Description	By	Date	App
0	FIRST ISSUE	CL	02/13	RR

Carnell

Carnell Support Services Ltd

Gothic House
Market Place
Penkridge
Staffordshire
ST19 5DJ

0800 328 0914
info@carnellgroup.co.uk
www.carnellgroup.co.uk

HIGHWAYS AGENCY

enterprise mouchel

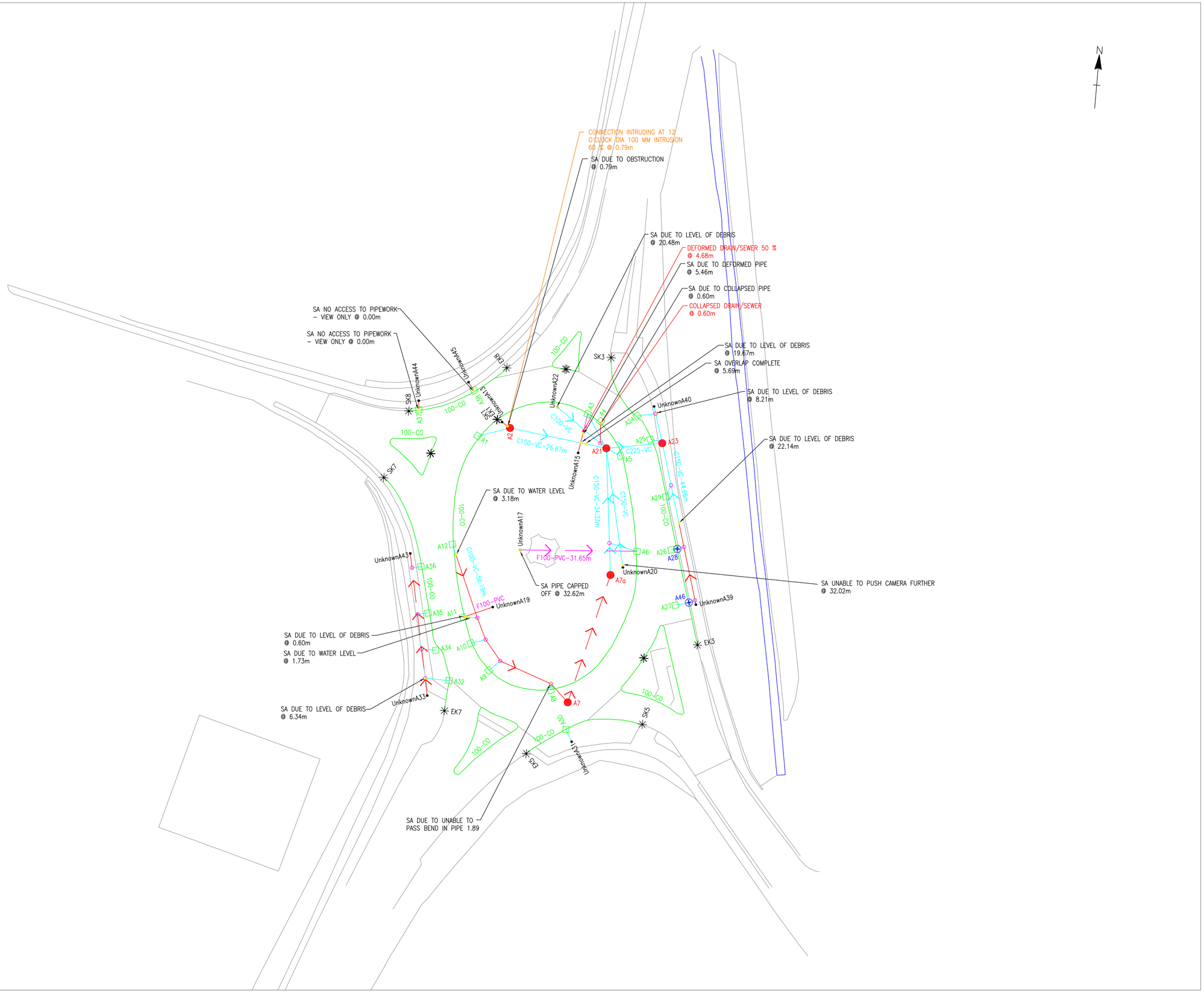
Project Title:
HIGHWAYS AGENCY
AREA 13
A585 AMOUNDERNESS WAY

Drawing Title:
CONDITION DRAWING

Scheme No:	13_9038a		
Dwg Scale:	1:500 @ A1	Sheet No:	1 OF 1
Drawn By:	CL	Date:	08/02/13
Checked By:	MW	Date:	08/02/13
Approved By:	RR	Date:	08/02/13

Drawing Number: 9038a_CO_001
Revision: 0

File:\Area 13\Water\2012 - 2013\9038 - A585 Amounderness Way (Inc Eros Rbt) Hotspot 254\Operational\Report\Report Documents\Final Report\Drawings



SYMBOLOGY:

- SUB SURFACE CONTINUOUS ITEMS
- SUB SURFACE CONTINUOUS ITEMS UNSURVEYED
- COMBINED SURFACE AND SUB SURFACE ITEMS
- COMBINED SURFACE AND SUB SURFACE ITEMS UNSURVEYED
- SURFACE CONTINUOUS ITEMS
- PHANTOM CONNECTOR

SYMBOLS:

- MANHOLE
- OUTFALL
- OUTLET
- INLET
- PUMPING STATION
- GULLY
- GRIP INLET
- SOAKAWAY
- OIL INTERCEPTOR
- SILT INTERCEPTOR
- CATCHPIT
- GHOST NODE
- PHANTOM NODE
- RODDING EYE
- OTHER SPECIAL CHAMBER
- CONNECTOR NODE
- MARKER POST REF

PIPE (e.g F=FILTER, C=CARRIER PIPES)
DIAMETER
MATERIAL
PIPE LENGTH (m)
C300–CO–100.000

DEFECT SYMBOLS

- LOCATION OF GRADE 4 DEFECTS
- LOCATION OF GRADE 5 DEFECTS
- LOCATION OF SURVEY ABANDONED

NOTE:
GPS CHAMBERS / GULLY'S etc ARE SHOWN AS CO–ORDINATES AND MAY APPEAR TO BE IN CONFLICT WITH THEIR ACTUAL POSITION IN RELATION TO THE CARRIAGEWAY MARKINGS GIVEN

Rev	Description	By	Date	App
0	FIRST ISSUE	CL	02/13	RR

Carnell

Carnell Support Services Ltd

Gothic House
Market Place
Penkridge
Staffordshire
ST19 5DJ

0800 328 0914
info@carnellgroup.co.uk
www.carnellgroup.co.uk

HIGHWAYS AGENCY

enterprise mouchel

Project Title:
HIGHWAYS AGENCY
AREA 13
EROS ROUNDABOUT

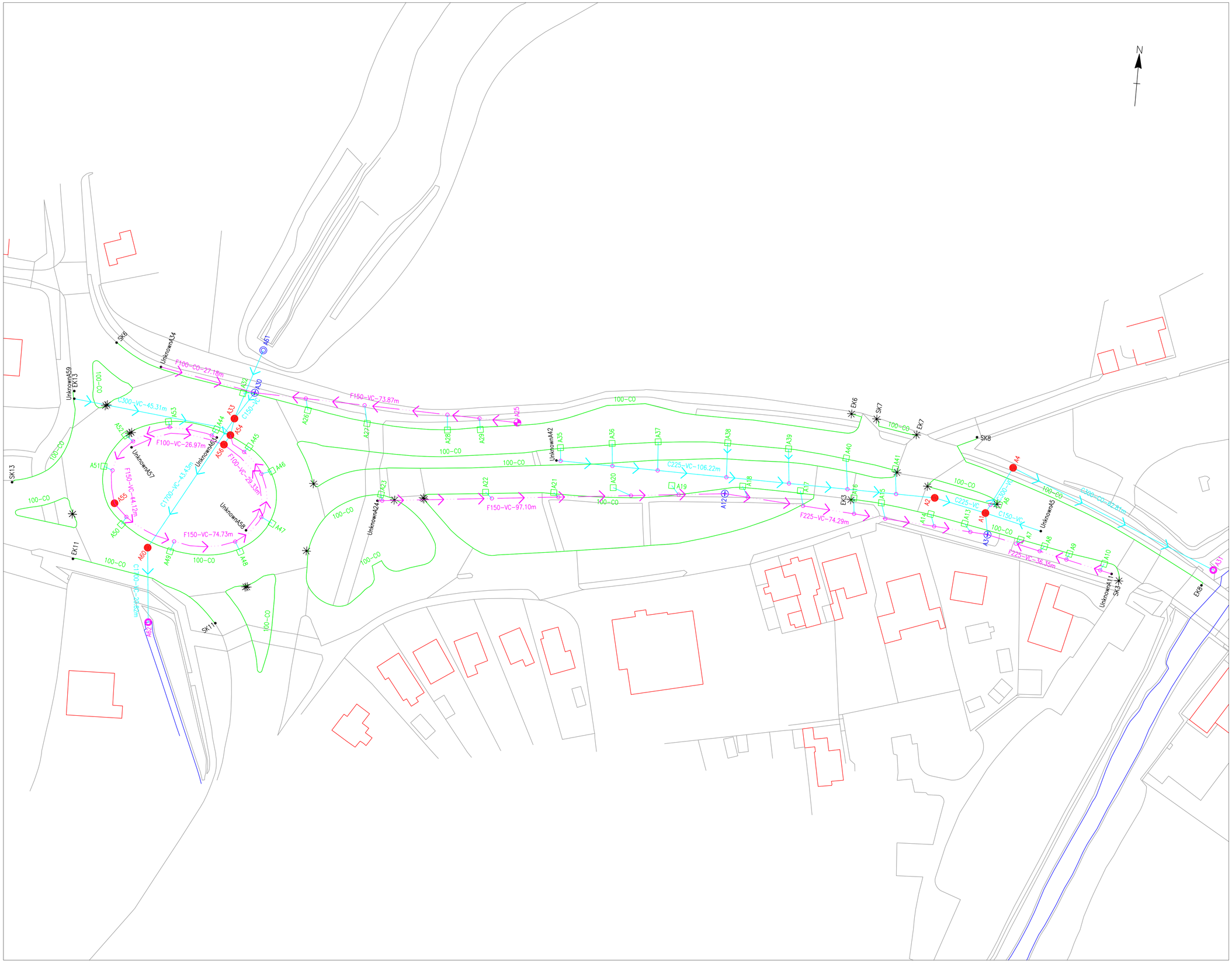
Drawing Title:
CONDITION DRAWING

Scheme No:	13_9038b		
Dwg Scale:	1:500 @ A1	Sheet No:	1 OF 1
Drawn By:	CL	Date:	08/02/13
Checked By:	MW	Date:	08/02/13
Approved By:	RR	Date:	08/02/13

Drawing Number: 9038b_CO_001

Revision: 0

File: Area 13\Water\2012 - 2013\9038 - A585 Amounderness Way (Inc Eros Rbt) Hotspot 254\Operational\Report\Report Documents\Final Report\Drawings



SYMBOLOGY:

SUB SURFACE CONTINUOUS ITEMS

COMBINED SURFACE AND SUB SURFACE ITEMS

SURFACE CONTINUOUS ITEMS

PHANTOM CONNECTOR

SYMBOLS:

MANHOLE

OUTFALL

OUTLET

INLET

PUMPING STATION

GULLY

GRIP INLET

SOAKAWAY

OIL INTERCEPTOR

SILT INTERCEPTOR

CATCHPIT

GHOST NODE

PHANTOM NODE

RODDING EYE

OTHER SPECIAL CHAMBER

CONNECTOR NODE

MARKER POST REF

PIPE (e.g F=FILTER, C=CARRIER PIPES)
DIAMETER
MATERIAL
PIPE LENGTH (m)

C300-CO-100.000

NOTE:
GPS CHAMBERS / GULLY'S etc ARE SHOWN AS CO-ORDINATES AND MAY APPEAR TO BE IN CONFLICT WITH THEIR ACTUAL POSITION IN RELATION TO THE CARRIAGEWAY MARKINGS GIVEN

Rev	Description	By	Date	App
0	FIRST ISSUE	CL	02/13	RR

Carnell

Carnell Support Services Ltd

Gothic House
Market Place
Penkridge
Staffordshire
ST19 5DJ

0800 328 0914
info@carnellgroup.co.uk
www.carnellgroup.co.uk

HIGHWAYS AGENCY

enterprise mouchel

Project Title:
HIGHWAYS AGENCY
AREA 13
A585 AMOUNDERNESS WAY

Drawing Title:
ASSET INVENTORY DRAWING

Scheme No:	13_9038a		
Dwg Scale:	1:500 @ A1	Sheet No:	1 OF 1
Drawn By:	CL	Date:	08/02/13
Checked By:	MW	Date:	08/02/13
Approved By:	RR	Date:	08/02/13

Drawing Number: 9038a_AI_001

Revision: 0

File: V:\Area 13\Water\2012 - 2013\9038 - A585 Amounderness Way (Inc Eros Rbt) Hotspot 254\Operational\Report\Report Documents\Final Report\Drawings

SYMBOLOGY:

SUB SURFACE CONTINUOUS ITEMS

COMBINED SURFACE AND SUB SURFACE ITEMS

SURFACE CONTINUOUS ITEMS

PHANTOM CONNECTOR

SYMBOLS:

MANHOLE

OUTFALL

OUTLET

INLET

PUMPING STATION

GULLY

GRIP INLET

SOAKAWAY

OIL INTERCEPTOR

SILT INTERCEPTOR

CATCHPIT

GHOST NODE

PHANTOM NODE

RODDING EYE

OTHER SPECIAL CHAMBER

CONNECTOR NODE

MARKER POST REF

C300-CO-100.000
- PIPE (e.g F=FILTER, C=CARRIER PIPES)
- DIAMETER
- MATERIAL
- PIPE LENGTH (m)

NOTE:
GPS CHAMBERS / GULLY'S etc ARE SHOWN AS CO-ORDINATES AND MAY APPEAR TO BE IN CONFLICT WITH THEIR ACTUAL POSITION IN RELATION TO THE CARRIAGEWAY MARKINGS GIVEN

Rev	Description	By	Date	App
0	FIRST ISSUE	CL	02/13	RR

Carnell Support Services Ltd

Gothic House
Market Place
Penkridge
Staffordshire
ST19 5DJ

0800 328 0914
info@carnellgroup.co.uk
www.carnellgroup.co.uk

HIGHWAYS AGENCY

enterprise mouchel

Project Title:
HIGHWAYS AGENCY
AREA 13
EROS ROUNDABOUT

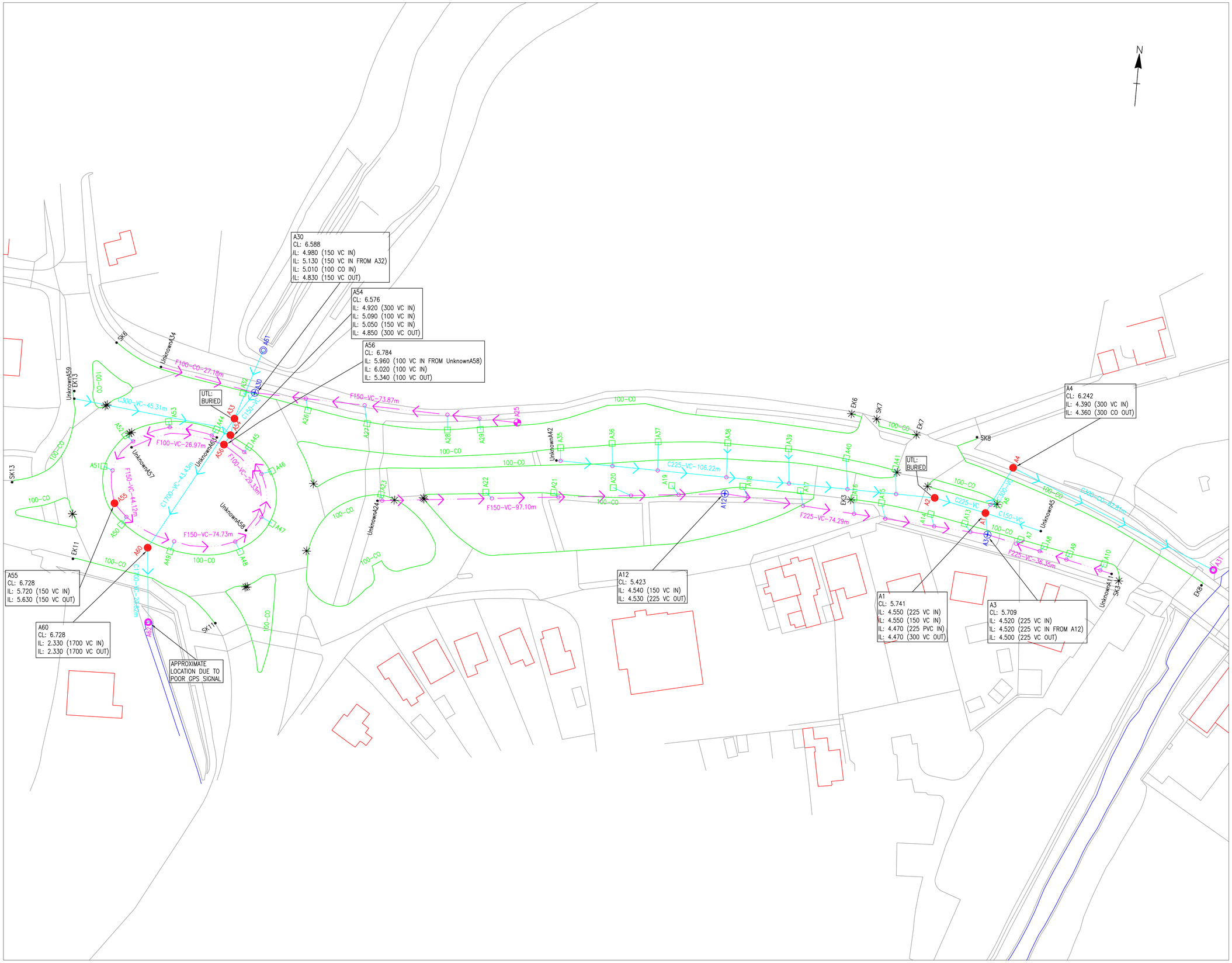
Drawing Title:
ASSET INVENTORY DRAWING

Scheme No:	13_9038b		
Dwg Scale:	1:500 @ A1	Sheet No:	1 OF 1
Drawn By:	CL	Date:	08/02/13
Checked By:	MW	Date:	08/02/13
Approved By:	RR	Date:	08/02/13

Drawing Number: 9038b_AI_001

Revision: 0

File: V:\Area 13\Water\2012 - 2013\9038 - A585 Amounderness Way (Inc Eros Rbt) Hotspot 254\Operational\Report\Report Documents\Final Report\Drawings



SYMBOLOGY:

- SUB SURFACE CONTINUOUS ITEMS
- COMBINED SURFACE AND SUB SURFACE ITEMS
- SURFACE CONTINUOUS ITEMS
- PHANTOM CONNECTOR

SYMBOLS:

- MANHOLE
- OUTFALL
- OUTLET
- INLET
- PUMPING STATION
- GULLY
- GRIP INLET
- SOAKAWAY
- OIL INTERCEPTOR
- SILT INTERCEPTOR
- CATCHPIT
- GHOST NODE
- PHANTOM NODE
- RODDING EYE
- OTHER SPECIAL CHAMBER
- CONNECTOR NODE
- MARKER POST REF

PIPE (e.g F=FILTER, C=CARRIER PIPES)
DIAMETER
MATERIAL
PIPE LENGTH (m)
C300-CO-100.000

CL: COVER LEVEL
IL: INVERT LEVEL

NOTE:
GPS CHAMBERS / GULLY'S etc ARE SHOWN AS CO-ORDINATES AND MAY APPEAR TO BE IN CONFLICT WITH THEIR ACTUAL POSITION IN RELATION TO THE CARRIAGEWAY MARKINGS GIVEN

Rev	Description	By	Date	App
0	FIRST ISSUE	CL	02/13	RR

Carnell

Carnell Support Services Ltd

Gothic House
Market Place
Penkridge
Staffordshire
ST19 5DJ

0800 328 0914
info@carnellgroup.co.uk
www.carnellgroup.co.uk

HIGHWAYS AGENCY

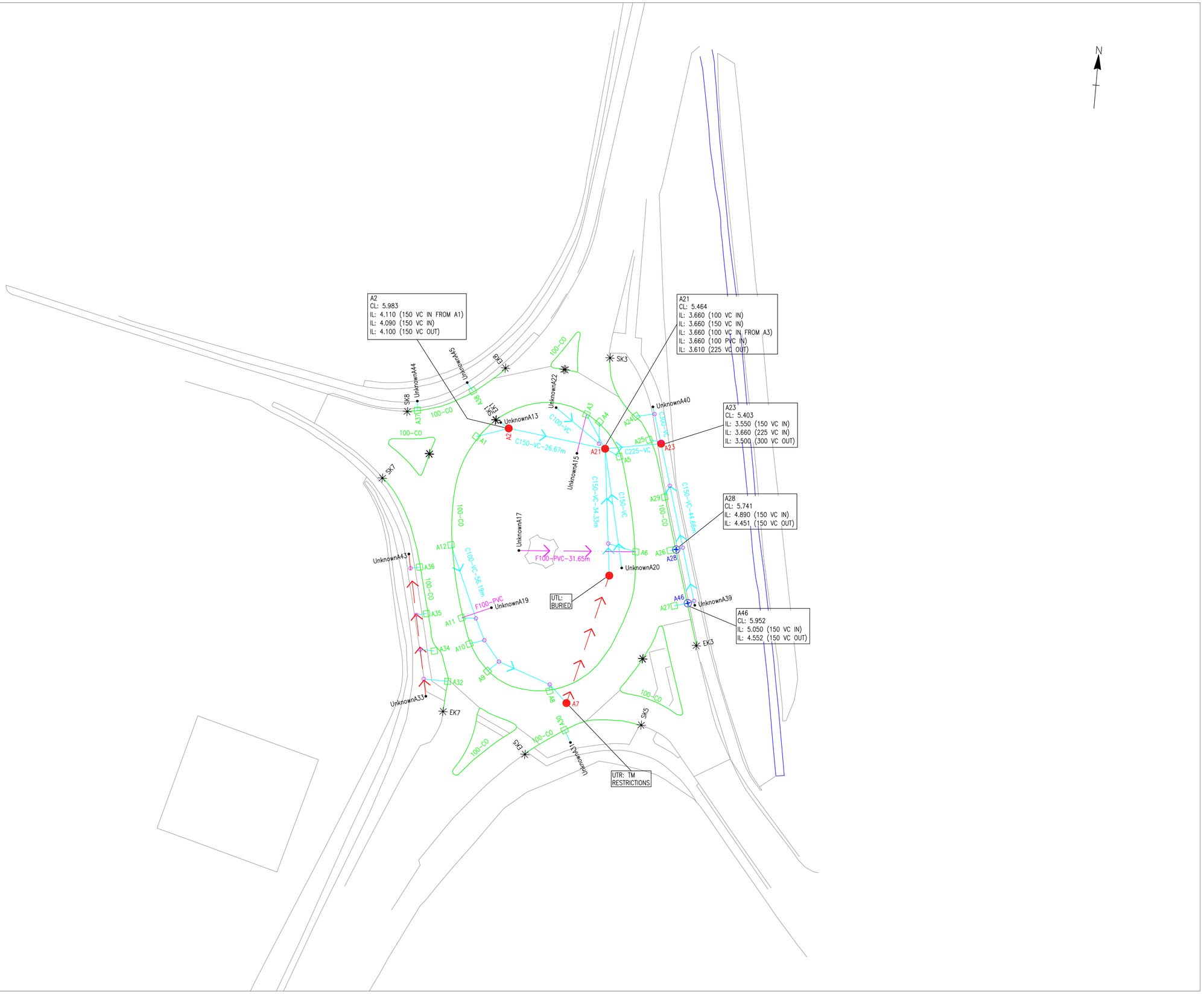
enterprise mouchel

Project Title:
HIGHWAYS AGENCY
AREA 13
A585 AMOUNDERNESS WAY

Drawing Title:
DESIGN DRAWING

Scheme No:	13_9038a		
Dwg Scale:	1:500 @ A1	Sheet No:	1 OF 1
Drawn By:	CL	Date:	08/02/13
Checked By:	MW	Date:	08/02/13
Approved By:	RR	Date:	08/02/13

Drawing Number: 9038a_DE_001
Revision: 0



SYMBOLOGY:

SUB SURFACE CONTINUOUS ITEMS

COMBINED SURFACE AND SUB SURFACE ITEMS

SURFACE CONTINUOUS ITEMS

PHANTOM CONNECTOR

SYMBOLS:

MANHOLE

OUTFALL

OUTLET

INLET

PUMPING STATION

GULLY

GRIP INLET

SOAKAWAY

OIL INTERCEPTOR

SILT INTERCEPTOR

CATCHPIT

GHOST NODE

PHANTOM NODE

RODDING EYE

OTHER SPECIAL CHAMBER

CONNECTOR NODE

MARKER POST REF

C300-CO-100.000
- PIPE (e.g F=FILTER, C=CARRIER PIPES)
- DIAMETER
- MATERIAL
- PIPE LENGTH (m)

CL: COVER LEVEL

IL: INVERT LEVEL

NOTE:
GPS CHAMBERS / GULLY'S etc ARE SHOWN AS CO-ORDINATES AND MAY APPEAR TO BE IN CONFLICT WITH THEIR ACTUAL POSITION IN RELATION TO THE CARRIAGEWAY MARKINGS GIVEN

Rev	Description	By	Date	App
0	FIRST ISSUE	CL	02/13	RR

Carnell

Carnell Support Services Ltd

Gothic House
Market Place
Penkridge
Staffordshire
ST19 5DJ

0800 328 0914
info@carnellgroup.co.uk
www.carnellgroup.co.uk

HIGHWAYS AGENCY

enterprise mouchel

Project Title:

HIGHWAYS AGENCY
AREA 13
EROS ROUNDABOUT

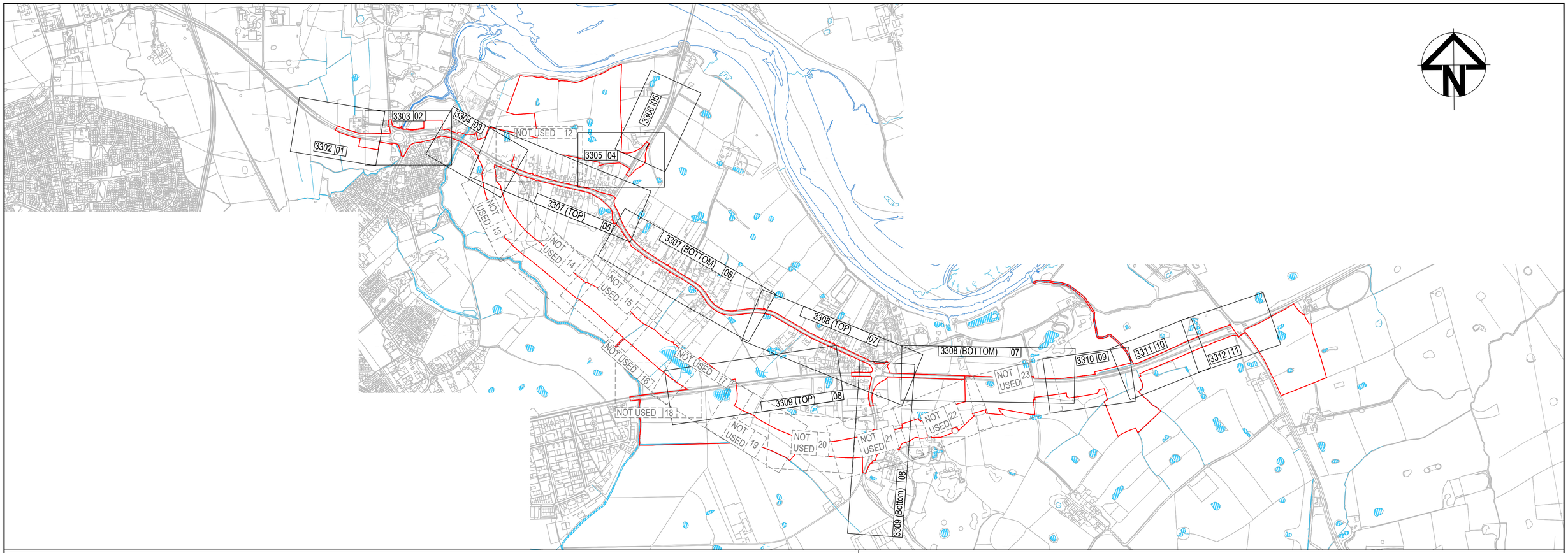
Drawing Title:

DESIGN DRAWING

Scheme No:	13_9038b		
Dwg Scale:	1:500 @ A1	Sheet No:	1 OF 1
Drawn By:	CL	Date:	08/02/13
Checked By:	MW	Date:	08/02/13
Approved By:	RR	Date:	08/02/13

Drawing Number:	Revision
9038b_DE_001	0

Appendix B – Existing drainage asset and condition survey plans (Gap analysis plans)



DRAINAGE LEGEND :

- PROPOSED REDLINE BOUNDARY
- 225 Ø — EXISTING DRAINAGE TO BE REMOVED - CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- 225 Ø — EXISTING DRAINAGE TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- 225 Ø — EXISTING DRAINAGE TO BE RETAINED - CCTV ASSET AND CONDITION SURVEY REQUIRED
- 225 Ø — EXISTING DRAINAGE TO BE REMOVED - ASSET SURVEY REQUIRED (NO CCTV CONDITION SURVEY)
- EXISTING DRAINAGE GULLY POT WITH CONNECTIONTO BE REMOVED - CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- EXISTING DRAINAGE GULLY POT WITH CONNECTION TO BE RETAINED - CCTV ASSET AND CONDITION SURVEY REQUIRED
- EXISTING DRAINAGE GULLY POT WITH CONNECTION TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE/CATCHPITTO BE REMOVED - CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE/CATCHPIT TO BE RETAINED - CCTV ASSET AND CONDITION SURVEY REQUIRED
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE/CATCHPIT TO BE REMOVED - ASSET SURVEY REQUIRED (NO CCTV CONDITION SURVEY)
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE\CATCHPIT TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- EXISTING DRAINAGE TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- NO EXISTING DRAINAGE DATA AVAILABLE - LOCATE EXISTING DRAINAGE ASSETS AND UNDERTAKE CCTV ASSET AND CONDITION SURVEY
- Pond — EXISTING WATERBODIES
- ASSUMED EXISTING HEADWALL / OUTFALLL LOCATION
- PROPOSED ROAD LAYOUT
- ORDNANCE SURVEY
- EXISTING ROAD
- 3311 | 10 — SHEET NO. / DRAWING NO.

DRAINAGE GENERAL NOTES :

1. ALL PIPE SIZES ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS STATED OTHERWISE.
2. WRITTEN SCALES (EG. 1:1000, 1:500, ETC.) APPLY TO DRAWINGS AT A1 PAPER SIZE UNLESS NOTED OTHERWISE.
3. DO NOT SCALE DIRECTLY FROM DRAWINGS, USE FIGURED DIMENSIONS ONLY.
4. REFER TO CCTV ASSET SPECIFICATION HE-548643-ARC- HDG-A585-RP-D-3037.
5. CCTV ASSET AND CONDITION SURVEYS ARE TO BE UNDERTAKEN ON ALL IDENTIFIED AND UNIDENTIFIED DRAINAGE ASSET AS HIGHLIGHTED ON THESE PLANS.
6. SHEET NO. 12 TO 23 NOT TO BE REFERRED FOR THIS PACKAGE.

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

LOCATION PLAN

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) KEY PLAN

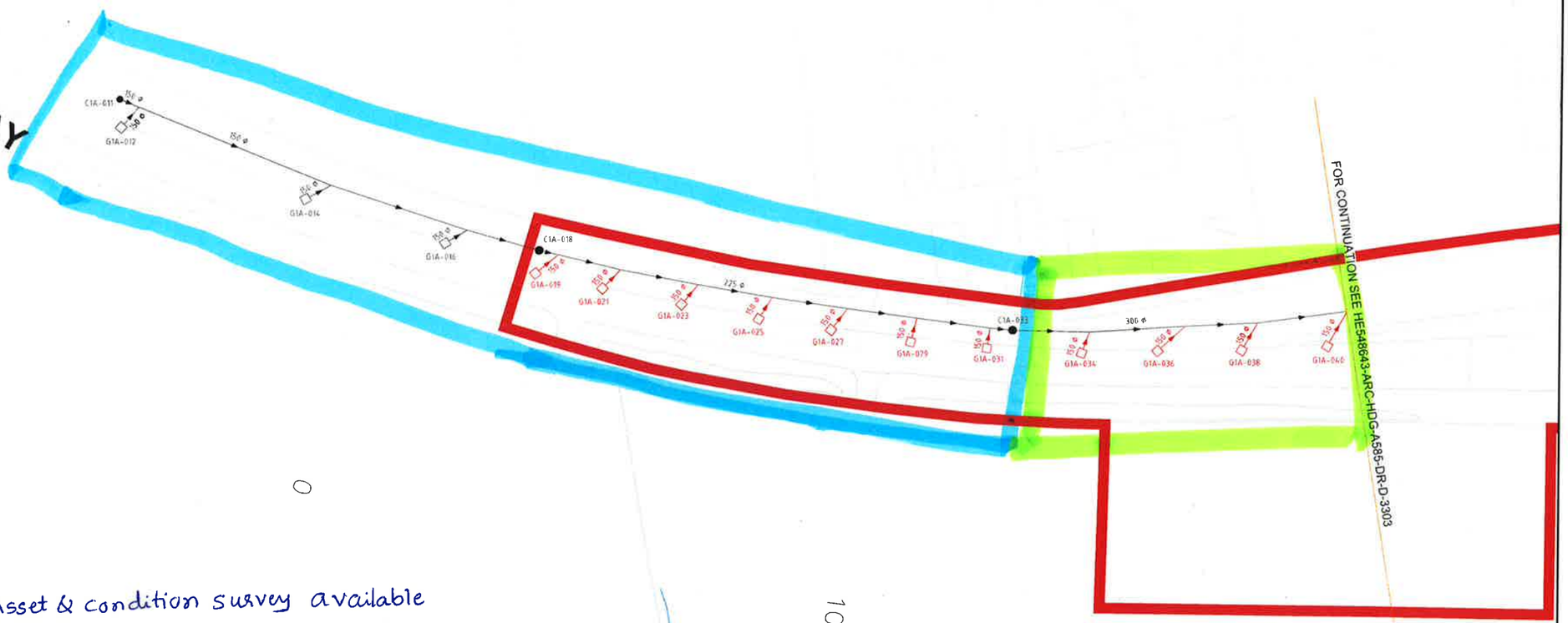
Status	PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date -	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN I Originator
	UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume I Location I Type I Role I Number
	HE548643-ARC-HDG-A585-DR-D-3301

100mm on Original

Print Date:

File Path:

A585 AMOUNDERNESS WAY



NO CCTV Asset & condition survey available

CCTV Asset & condition survey available

CCTV Asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London N1 9AB
Coordinating office: The Surrey Research Park, 10 Mediaver Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 1 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N. HENDERSON
Project No	UA008015
HA PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3302

100mm on Original

Print Date:

File Path:

B5412 SKIPPOOL ROAD

A585 BRECK ROAD

A588 BRECK ROAD

DRAINAGE ASSETS ON SKIPPOOL ROAD (B5412) TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

STRUCTURAL CONDITION SURVEY REQUIRED, METHODOLOGY TO BE CONFIRMED WITH SPECIALIST SUPPLIER

OUTFALL CATCHMENT-02A DETAILS TBC

OUTFALL CATCHMENT-01A DETAILS TBC

OUTFALL CATCHMENT-02B DETAILS TBC

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3302

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3304

E 440600

E 440500

No CCTV asset & condition survey available

CCTV Asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS

Registered office: Arcadis House, 34 York Way, London N1 9AB

Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

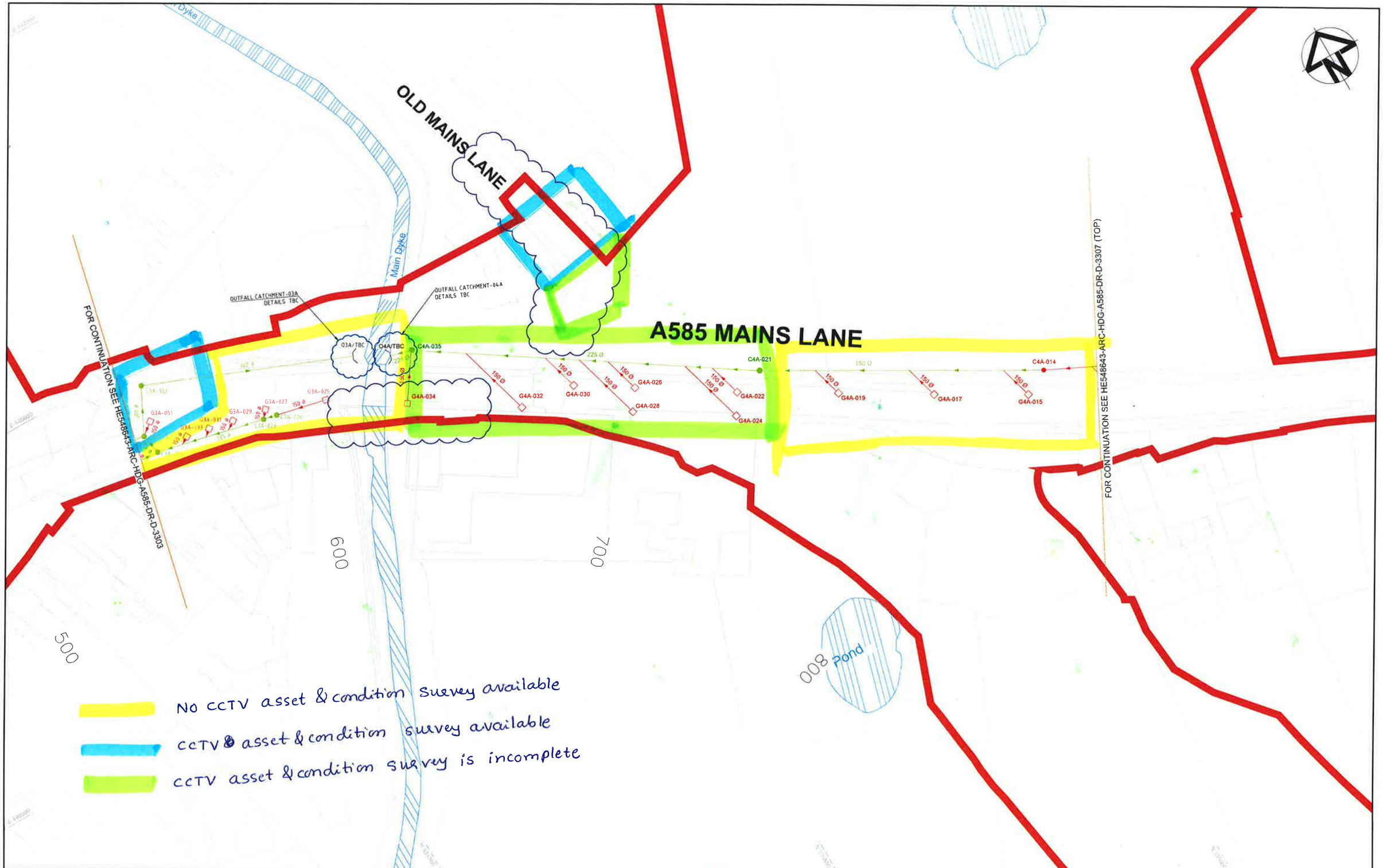
Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 2 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN | Originator: UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number: HE548643-ARC-HDG-A585-DR-D-3303

100mm on Original

Print Date:

File Path:



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 3 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date -	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N HENDERSON
Project No	UA008015
PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3304

Volume | Location | Type | Role | Number

100mm on Original

Print Date:

File Path:

Pond

E 440590

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3306

A588 SHARD ROAD

DRAINAGE ASSETS ON A588 TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

E 440400

No CCTV asset & condition Survey available

CCTV asset & condition survey available

CCTV asset & condition Survey is incomplete

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3307 (TOP)

Pond

Pond

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chk'd	Appr'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

Print Date:

File Path:

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

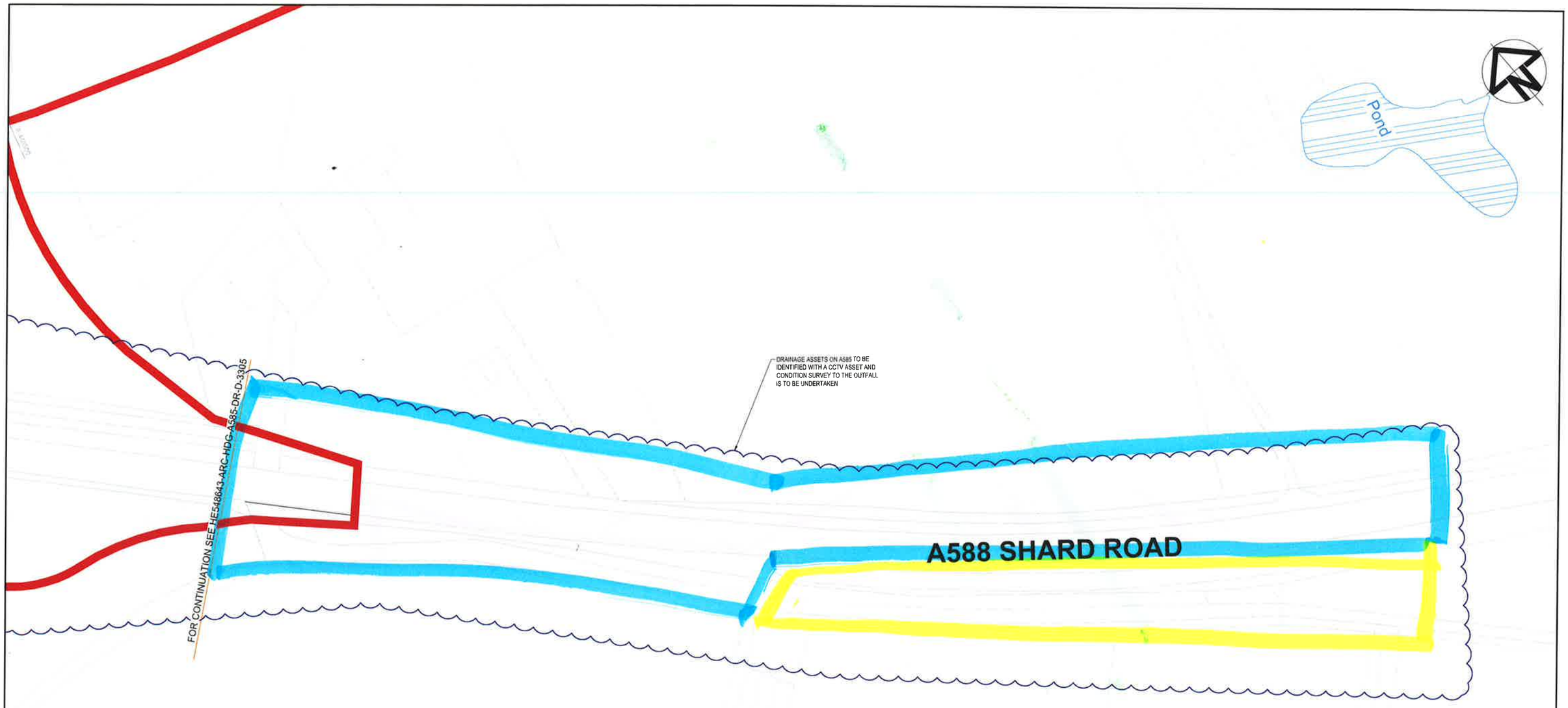
Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel +44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 4 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N. HENDERSON
Project No	HA PIN / Originator: UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number: HE548643-ARC-HDG-A585-DR-D-3305



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes
1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel .44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

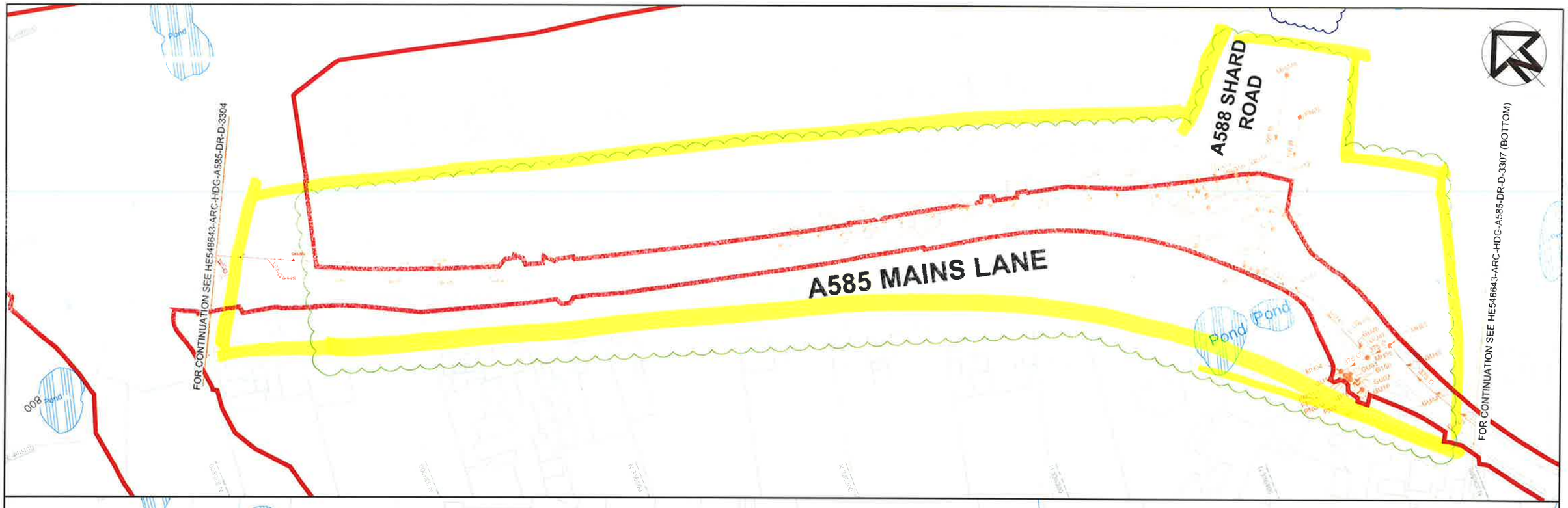
Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 5 OF 11

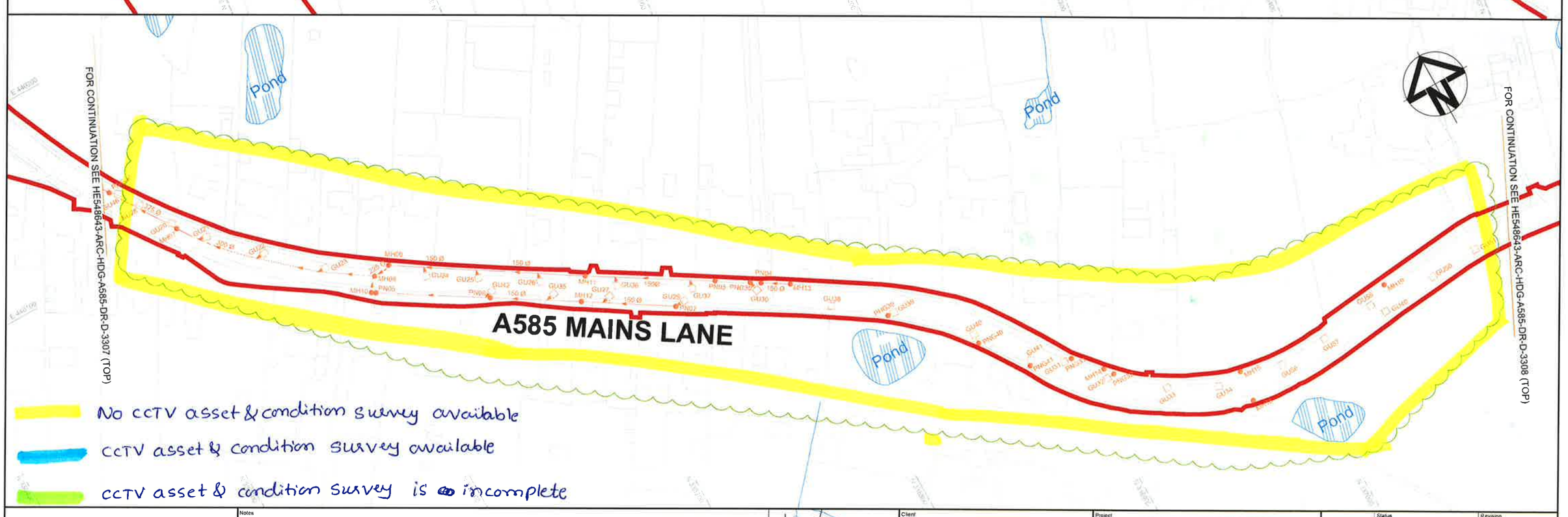
Status	PRELIMINARY DESIGN	Revision	P02
Scale	1:500	Date -	21FEB2018
Drawn By	SURESH G		
Checked By	A COPE		
Approved By	N HENDERSON		
Project No.	HA PIN / Originator	Original Size	A1
	UA008015 HE548643 ARC		
Drawing number	Volume | Location | Type | Role | Number		
	HE548643-ARC-HDG-A585-DR-D-3306		

100mm on Original

Print Date:

File Path:





Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS

Registered office: Arcadis House 34 York Way London N1 9AB

Coordinating office: The Surrey Research Park 10 Mediawer Road Guildford GU2 7AR Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

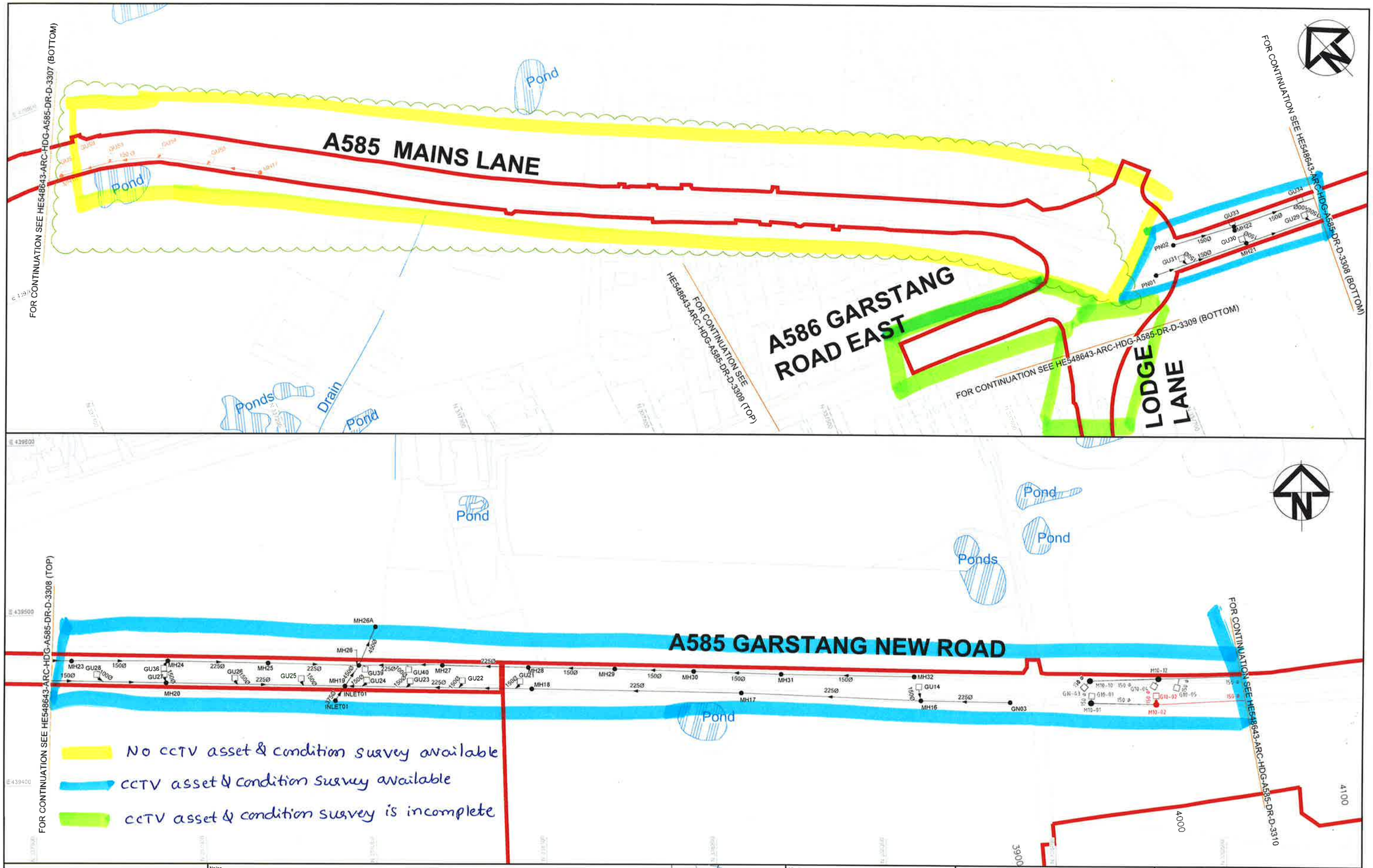
Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 6 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:1000
Date -	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	UA008015
I/A	HE548643
PIN	
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3307
Volume | Location	
Type | Role | Number	

100mm on Original

Print Date:

File Path:



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chk'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 7 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:1000
Date	21FEB2018
Drawn By	SURESH G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	UA008015
HA PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3308
Volume | Location | Type | Role | Number	

100mm on Original

Print Date:

File Path:

A586 GARSTANG ROAD EAST

Pond

Pond

Pond

Pond Extension Pond

Drain

2200

2500

2400

DRAINAGE ASSETS ON GARSTANG ROAD TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (TOP)

Pond

3100

3200

B5260 LODGE LANE

NO CCTV asset & condition survey available

CCTV asset & condition survey available

CCTV asset & condition survey is incomplete

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (TOP)

PN01 PN02 GU31 GU30 GU22 GU23 GU29 GU24 MH21

1500Ø 1600Ø

DRAINAGE ASSETS ON LODGE LANE TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (BOTTOM)

Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Appro'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 8 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:1000
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No	UA008015
PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3309

100mm on Original

Print Date:

File Path:

A585 GARSTANG NEW ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (BOTTOM)

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3311

Drain

M10-05 M10-06 M10-07 M10-14 M10-15 M10-16 M10-17 M10-18 M10-19 M10-20 M10-21 M10-22 M10-23 M10-24

G10-06 G10-07 G10-08 G10-09 G10-10 G10-11 G10-12 G10-13 G10-14 G10-15 G10-16 G10-17 G10-18

150 ø 225 ø

EXISTING CULVERT TO HAVE A CCTV ASSET AND CONDITION SURVEY TO CONFIRM THE INVERT LEVELS, ANY INCOMING PIPE INFORMATION AND FORM OF CONSTRUCTION

4000 4100 4200 4300

NO CCTV asset & condition survey available

CCTV asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Approv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 9 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	UA008015
Originator	HA PIN / ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3310

100mm on Original

Print Date:

File Path:

A585 GARSTANG NEW ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3310

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3312

EXISTING CULVERT TO HAVE A CCTV ASSET AND CONDITION SURVEY TO CONFIRM THE INVERT LEVELS, ANY INCOMING PIPE INFORMATION AND FORM OF CONSTRUCTION

EXISTING CULVERT TO HAVE A CCTV ASSET AND CONDITION SURVEY TO CONFIRM THE INVERT LEVELS, ANY INCOMING PIPE INFORMATION AND FORM OF CONSTRUCTION

Outfall Catchment - 010 & 011A

Pond

Pond

Pond

Drain

4400

4500

4600

4700

NO CCTV asset & condition survey available

CCTV asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Appr'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 10 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N HENDERSON
Project No.	HA PIN I Originator: UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume I Location I Type I Role I Number: HE548643-ARC-HDG-A585-DR-D-3311

100mm on Original

Print Date:

File Path:

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Appv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

2 . ALL GULLY OUTLET PIPES ARE 150mm DIAMETER UNLESS SPECIFIED.

LOCATION PLAN

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House 34 York Way London N1 9AB
Coordinating office: The Surrey Research Park 10 Medawar Road Guildford GU2 7AR Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 11 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN HE548643 | Originator ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number

UA008015

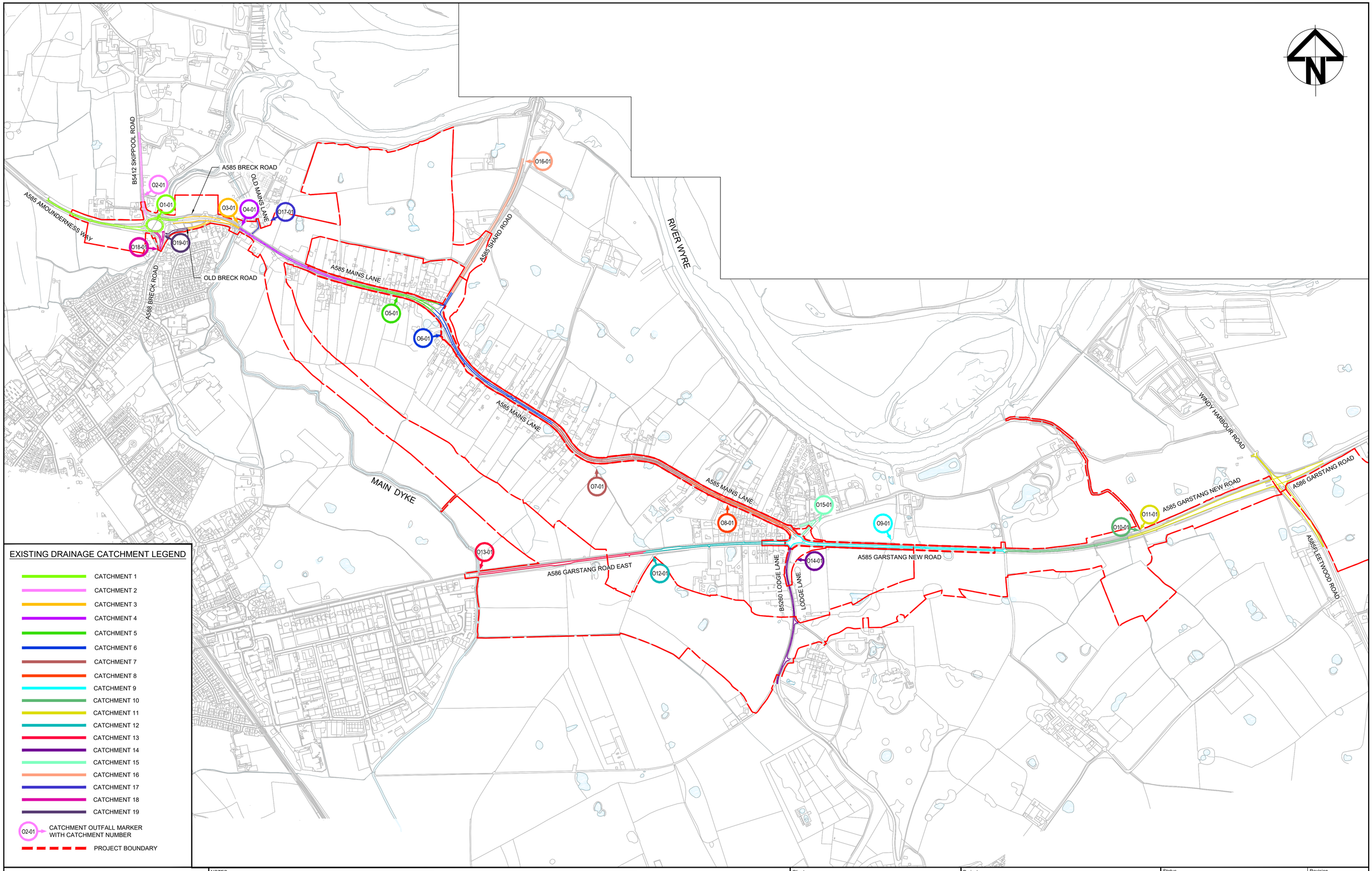
HE548643-ARC-HDG-A585-DR-D-3312

100mm on Original

Print Date:

File Path:

Appendix C – Existing drainage catchment and waterbodies plans



EXISTING DRAINAGE CATCHMENT LEGEND

- CATCHMENT 1
- CATCHMENT 2
- CATCHMENT 3
- CATCHMENT 4
- CATCHMENT 5
- CATCHMENT 6
- CATCHMENT 7
- CATCHMENT 8
- CATCHMENT 9
- CATCHMENT 10
- CATCHMENT 11
- CATCHMENT 12
- CATCHMENT 13
- CATCHMENT 14
- CATCHMENT 15
- CATCHMENT 16
- CATCHMENT 17
- CATCHMENT 18
- CATCHMENT 19
- O2-01 CATCHMENT OUTFALL MARKER WITH CATCHMENT NUMBER
- PROJECT BOUNDARY

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

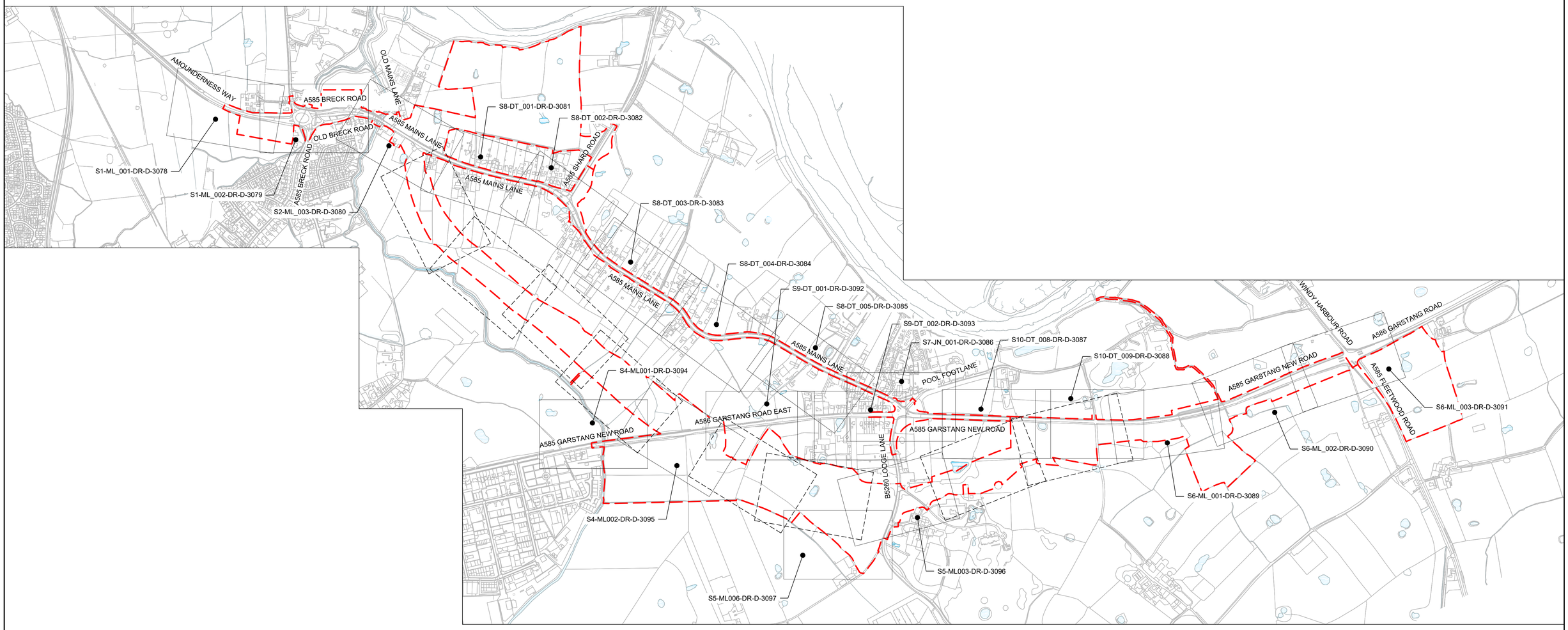
Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE CATCHMENT PLAN

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DR-D-3077

100mm on Original

Appendix D – Existing drainage and site clearance plans



KEY PLAN LEGEND

DRAINAGE LAYOUT USED

DRAINAGE LAYOUT NOT USED

NOTES

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

Client: highways england

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
The Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE KEY PLAN

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-SZ-GN_000-DR-D-3075

DRAINAGE LEGEND :

PROPOSED REDLINE BOUNDARY

ORDNANCE SURVEY

300 Ø — EXISTING PIPE TO BE RETAINED

300 Ø, CKD — CKD — EXISTING COMBINED KERB DRAIN TO BE RETAINED

300 Ø — EXISTING PIPE TO BE REMOVED

300 Ø, CKD — CKD — EXISTING COMBINED KERB DRAIN TO BE REMOVED

EXISTING DRAINAGE GULLY POT WITH CONNECTION TO BE RETAINED

EXISTING DRAINAGE GULLY POT WITH CONNECTION TO BE REMOVED

EXM1-001/EXC1-001 — EXISTING DRAINAGE MANHOLE / CATCHPIT TO BE RETAINED

EXM1-001/EXC1-001 — EXISTING DRAINAGE MANHOLE / CATCHPIT TO BE REMOVED

BT — BRITISH TELECOM

SW — EXISTING SEWER WATER MAIN

EXISTING ELECTRIC CABLE

W — EXISTING WATER MAIN

G (MP) — EXISTING GAS MAIN HIGH

LV — EXISTING LOW VOLTAGE CABLE

G (LP) — EXISTING GAS MAIN LOW

HV — EXISTING HIGH VOLTAGE CABLE

O/H — EXISTING MEDIUM VOLTAGE OVERHEAD CABLE

CCTV AND ASSET CONDITION SURVEY TO BE COMPLETED AT STAGE 5

CCTV AND ASSET CONDITION SURVEY DATA NOT AVAILABLE, TO BE COMPLETED AT STAGE 5

EXISTING WATER BODIES

ASSUMED EXISTING HEADWALL / OUTFALL TO BE RETAINED

O1-01 — EXISTING OUTFALL LOCATION

H11 — SAFTY, HEALTH AND ENVIRONMENT INFORMATION

S8-DT_01-DR-D-3077 — DRAWING NO.

H - 4 — PIPE DEFECT CODE

EXISTING CULVERT

DRAINAGE GENERAL NOTES

1. ALL PIPE SIZES ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS STATED OTHERWISE.
2. ALL GULLY OUTLET PIPES ARE 150mm DIAMETER UNLESS SPECIFIED.
3. WRITTEN SCALES (EG. 1:1000, 1:500, ETC.) APPLY TO DRAWINGS AT A1 PAPER SIZE UNLESS NOTED OTHERWISE.
4. DO NOT SCALE DIRECTLY FROM DRAWINGS, USE FIGURED DIMENSIONS ONLY.
5. THE LOCATION AND EXTENT OF EXISTING DRAINAGE ASSETS HAVE BEEN BASED ON CCTV ASSET AND CONDITION SURVEY WHERE AVAILABLE, WHERE CCTV DATA IS NOT AVAILABLE EXISTING DRAINAGE ASSETS HAVE BEEN BASED ON AS-BUILTS OR HADDMS DATA.
6. CONTRACTOR TO CONFIRM WITH DESIGNER'S SITE REPRESENTATIVE ALL TIE IN LEVELS AND LOCATIONS PRIOR COMMENCING THE WORKS.
7. FOR EXISTING UTILITIES DETAILS REFER DRAWING NUMBER " HE548643-ARC-VUT-A585-M2-D-3102".

STRUCTURAL DEFECT LIST :

Code	Structural Defects Grade	Structural Defects
B	4	Broken pipe
BJ	4	Broken Pipe at joint
FM	4	Fractures multiple
H	4	Hole in sewer
HJ	4	Hole in sewer at joint
D	5	Deformed drain/sewer
Code	Construction Grade	Constructional Features
CXI	4	Connection intruding
Code	Service Defects grade	Service Defects
IGJ	4	Infiltration Gushing at joint
RM	5	Mass Roots
RMJ	5	Mass Roots at joint

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

NOTES

Client: highways england

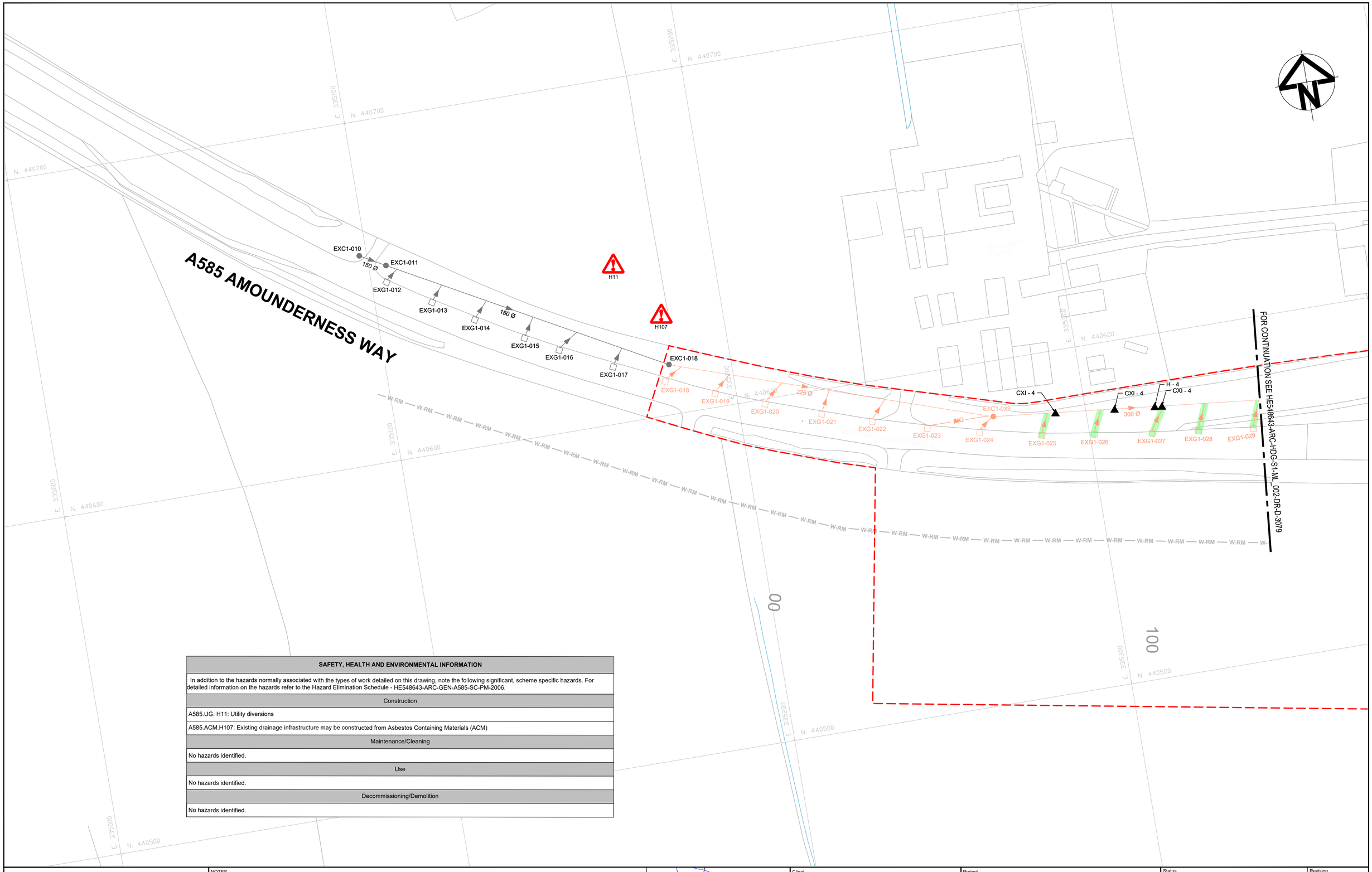
ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE NOTES & LEGEND

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE P/N | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DR-D-3076

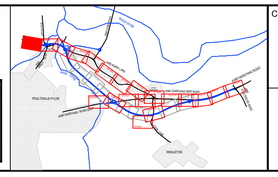


SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG. H11: Utility diversions
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 1 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S1-ML_001-DR-D-3078

100mm on Original

Print Date:

File Path:

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H108: Inundation of flood water
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
A585.UG.H11: Utility diversions
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

AMOUNDERNESS WAY

A585 BRECK ROAD

OLD BRECK ROAD

A585 BRECK ROAD

Skippool Creek

FOR CONTINUATION SEE HE548643-ARC-HDG-S1-ML_001-DR-D-3078

FOR CONTINUATION SEE HE548643-ARC-HDG-S2-ML_003-DR-D-3080

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 603 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 2 OF 20

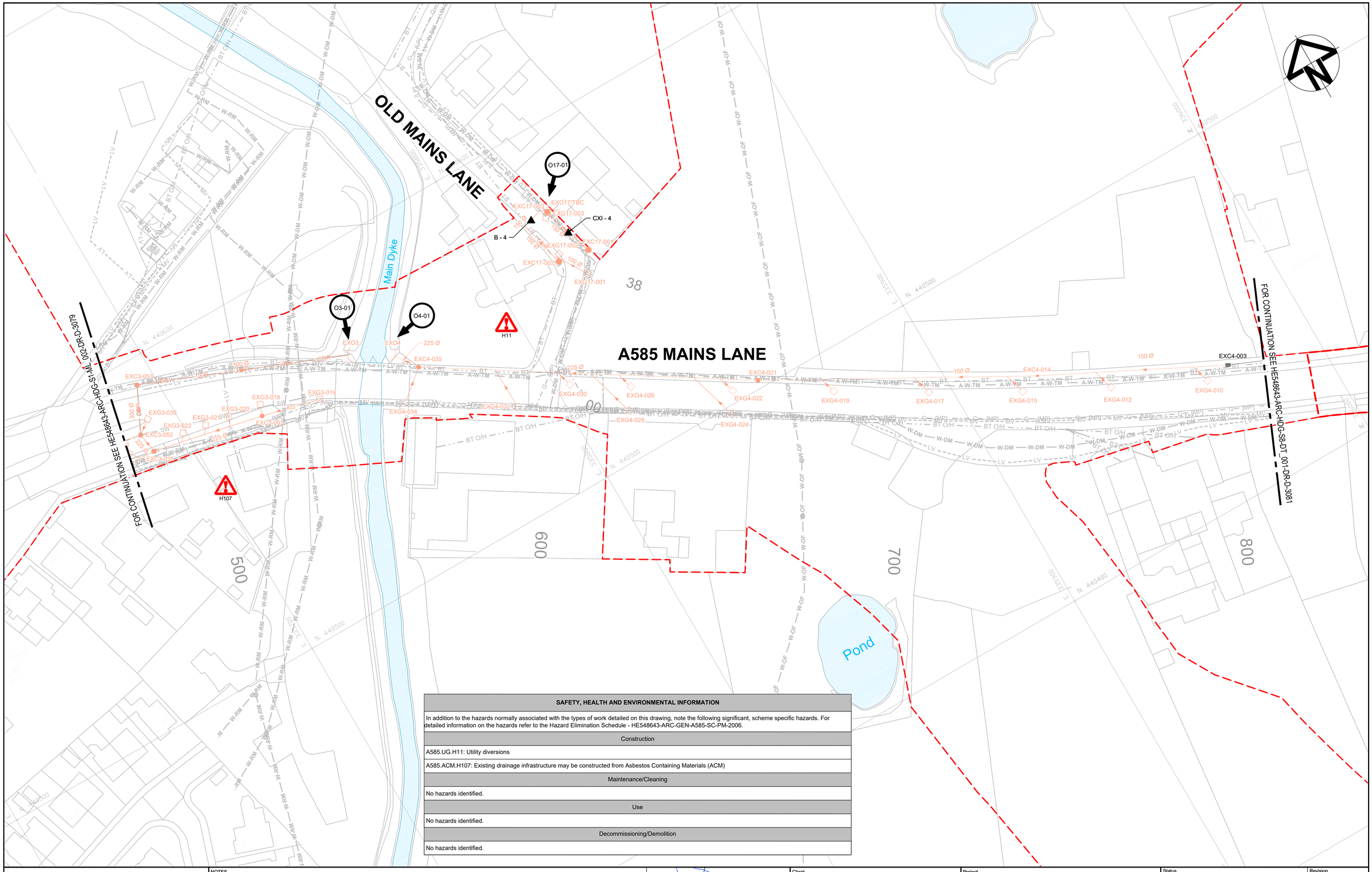
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S1-ML_002-DR-D-3079

100mm on Original

Print Date:

File Path:



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

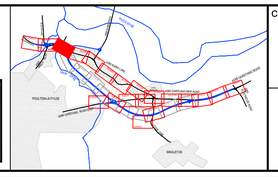
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.

Construction
A585.UG.H11: Utility diversions
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 3 OF 20

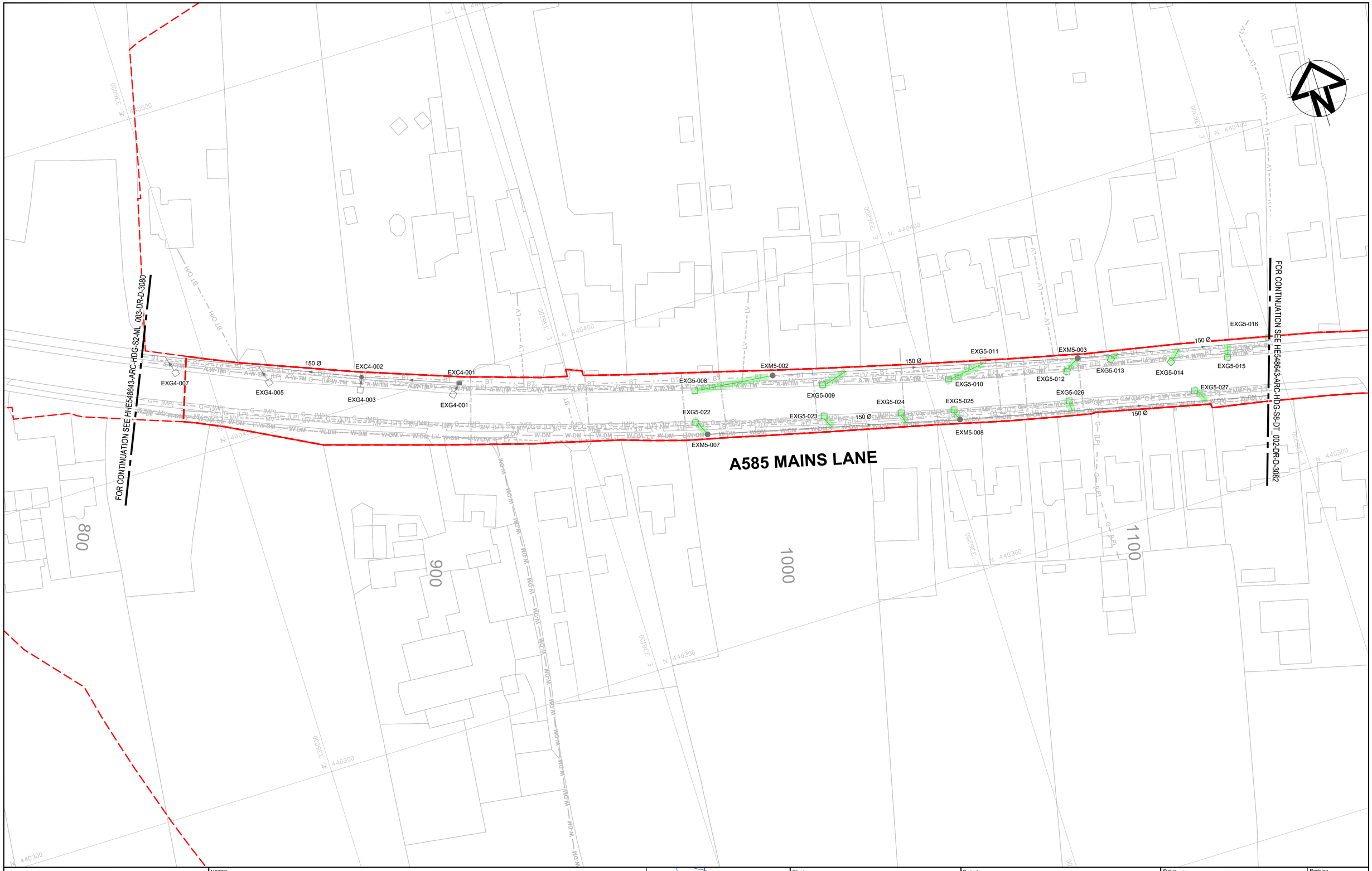
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S2-ML_003-DR-D-3080

100mm on Original

Print Date:

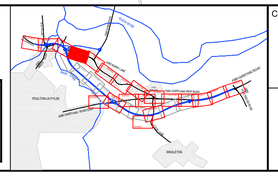
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 4 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S8-DT_001-DR-D-3081 (HE PIN | Originator | Volume | Location | Type | Role | Number)

100mm on Original

Print Date:

File Path:

A585 SHARD ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-S8-DT_001-DR-D-3081

FOR CONTINUATION SEE HE548643-ARC-HDG-S8-DT_003-DR-D-3083

EXM16-013 EXG16-014 EXG16-012 EXM5-001 EXG5-001 EXG16-011 EXG16-013 EXG16-015 EXM16-002 EXM16-003 EXG5-002 EXG5-003 EXG5-004 EXG5-005 EXG5-006 EXG5-007 EXG5-019 EXG5-018 EXG5-017 EXG6-003 EXG6-004 EXM6-001 EXG5-020 EXM5-004 EXM5-005 EXM5-006 EXG5-021 EXM5-009 EXO-5TBC O5-01 EXG6-005 EXG6-006 EXG6-048 EXM6-006 EXM6-005 EXG6-043 EXC6-004 EXG6-001 EXG6-002 EXG6-044 EXG6-045 EXG6-046 EXM6-007 EXG6-028 EXG6-020 EXG6-021 EXO6-TBC O6-01 EXM6-004 EXG6-016 EXG6-017 EXG6-019 EXG6-018

Pond Pond Pond

1200 1300 1400 1500

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076

Client: highways england

ARCADIS Design & Consultancy for natural and built assets

Registered office: Arcadis House, 34 York Way, London, N1 9AB

Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 5 OF 20

Status: S3 - PRELIMINARY DESIGN | Revision: P02

Scale: 1:500 | Date: 10JUL2018

Drawn By: G.SURESH

Checked By: A.COPE

Approved By: N.HENDERSON

Original Size: A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number

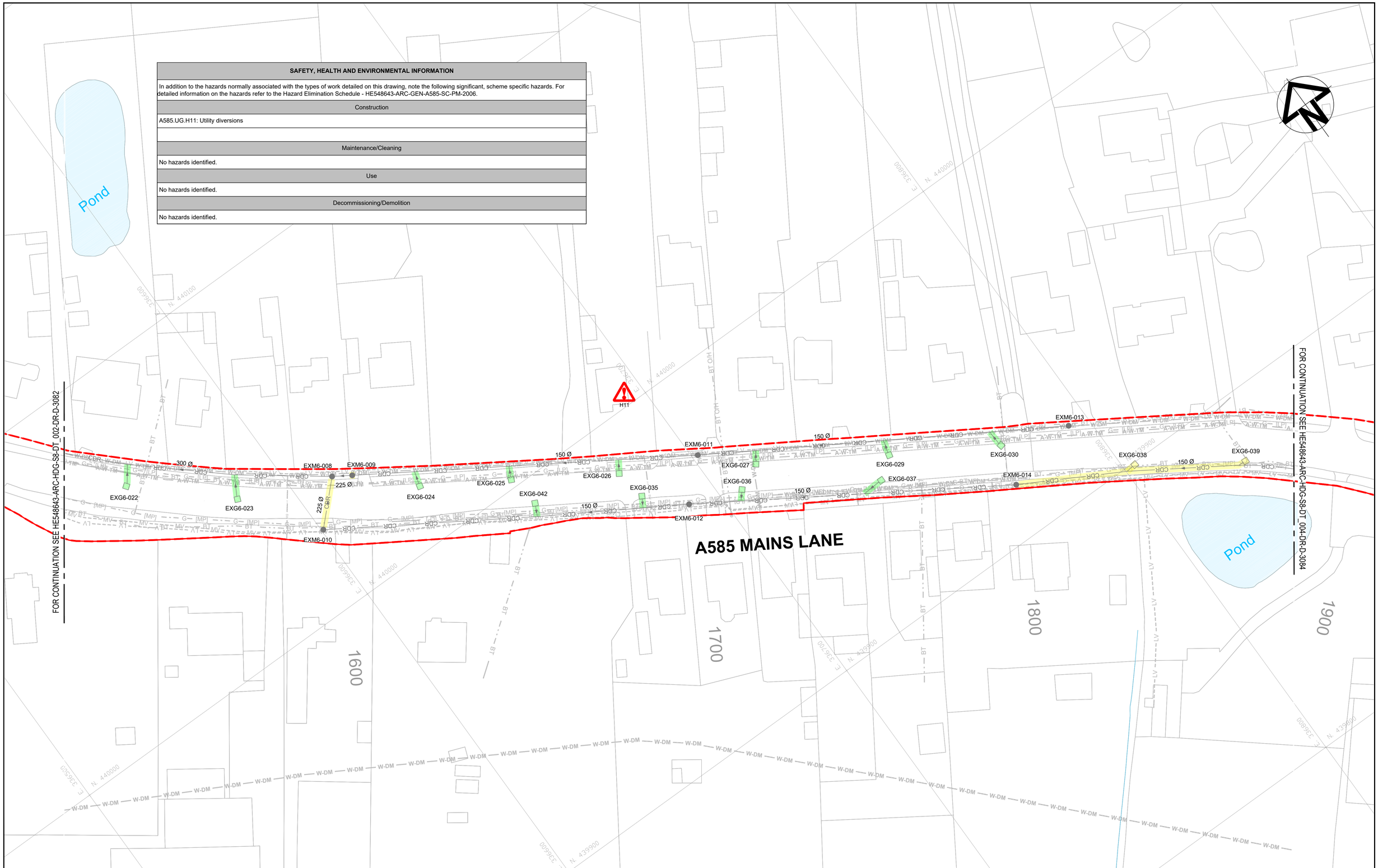
HE548643-ARC-HDG-S8-DT_002-DR-D-3082

100mm on Original

Print Date:

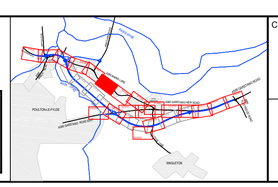
File Path:

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H11: Utility diversions
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

Print Date:

File Path:

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

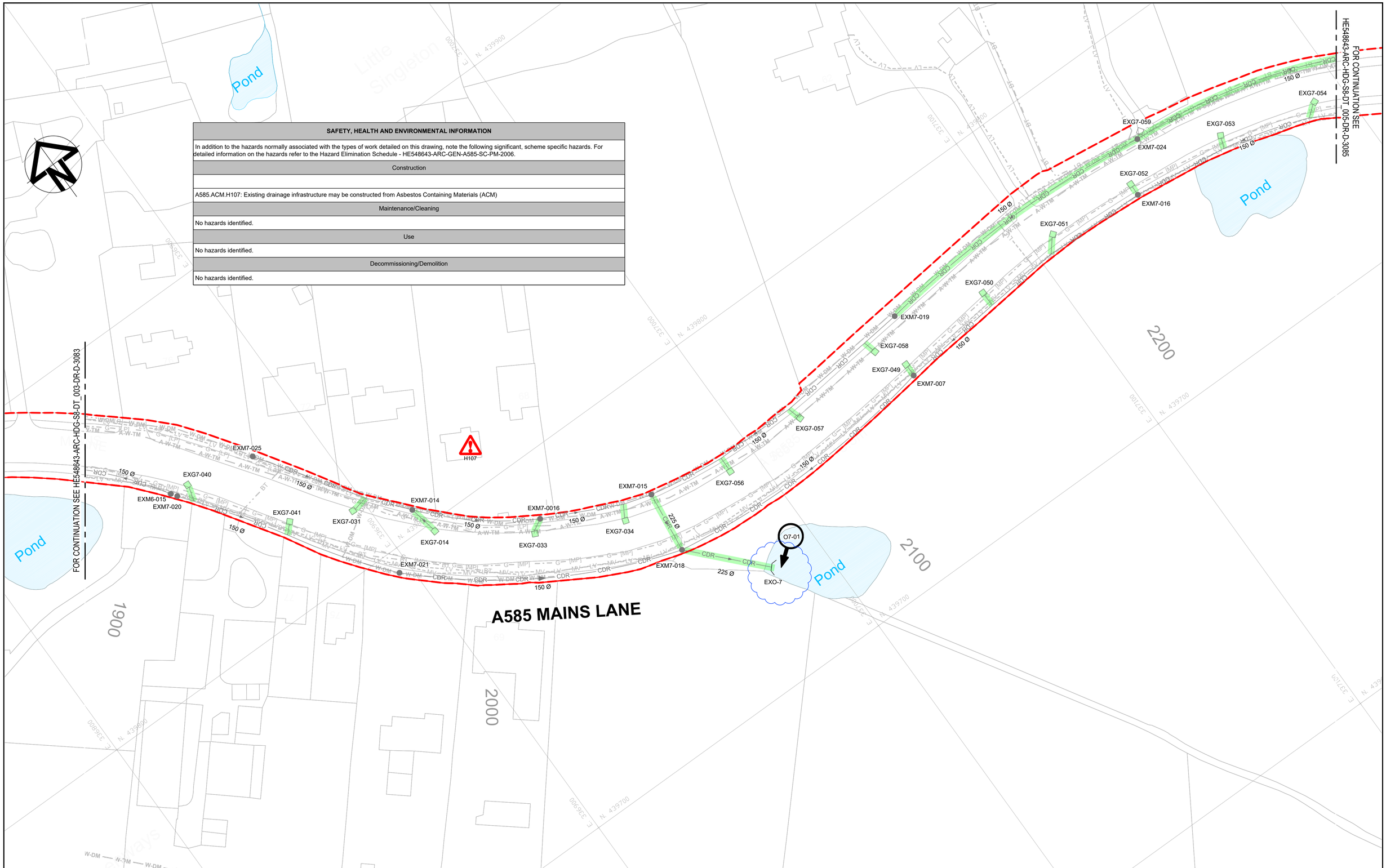
Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 6 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-S8-DT_003-DR-D-3083

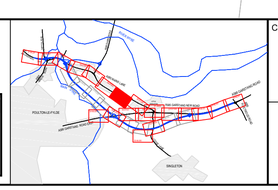
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 7 OF 20

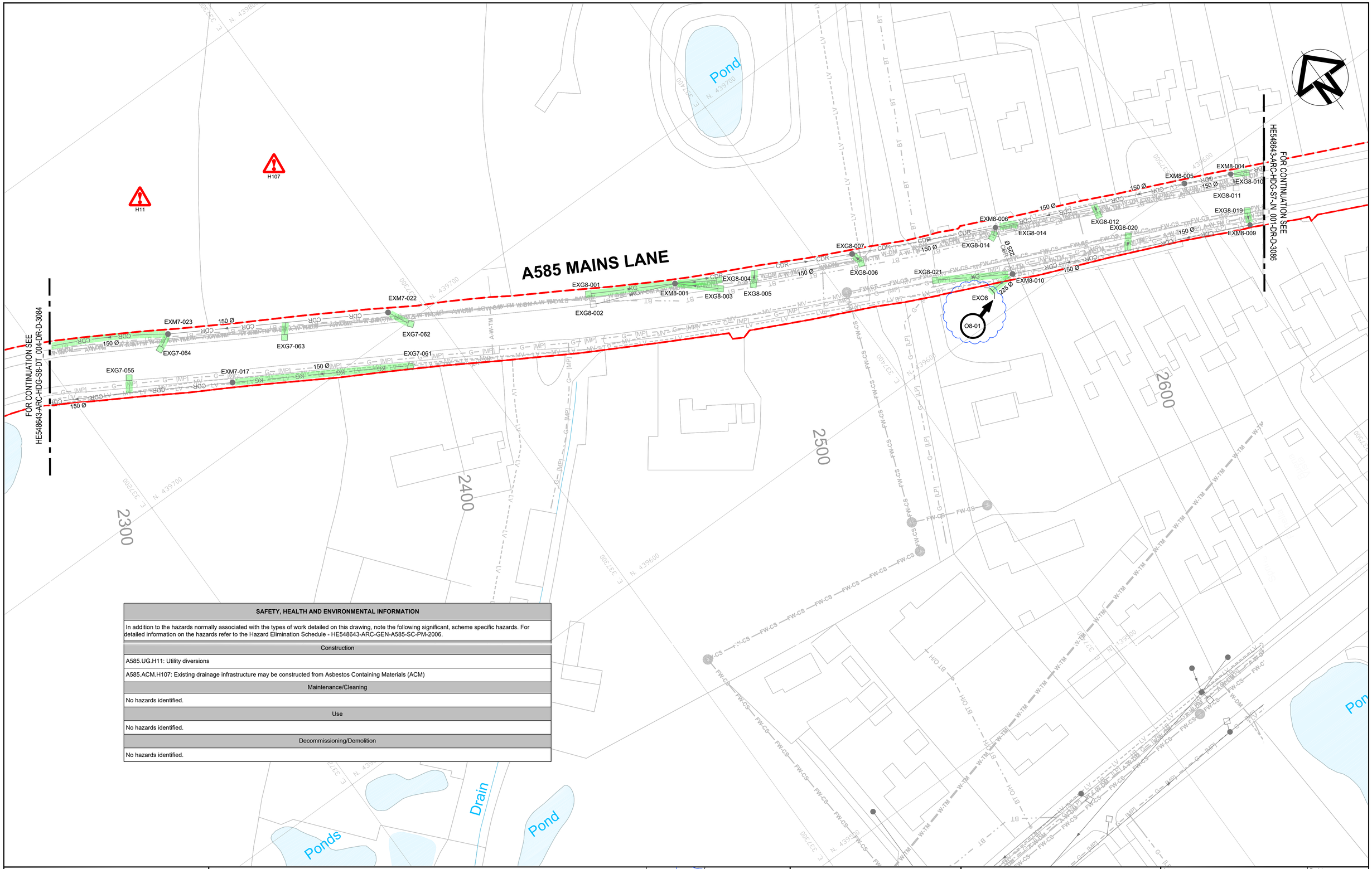
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S8-DT_004-DR-D-3084

100mm on Original

Print Date:

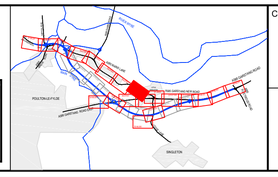
File Path:



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H11: Utility diversions
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES
1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 8 OF 20

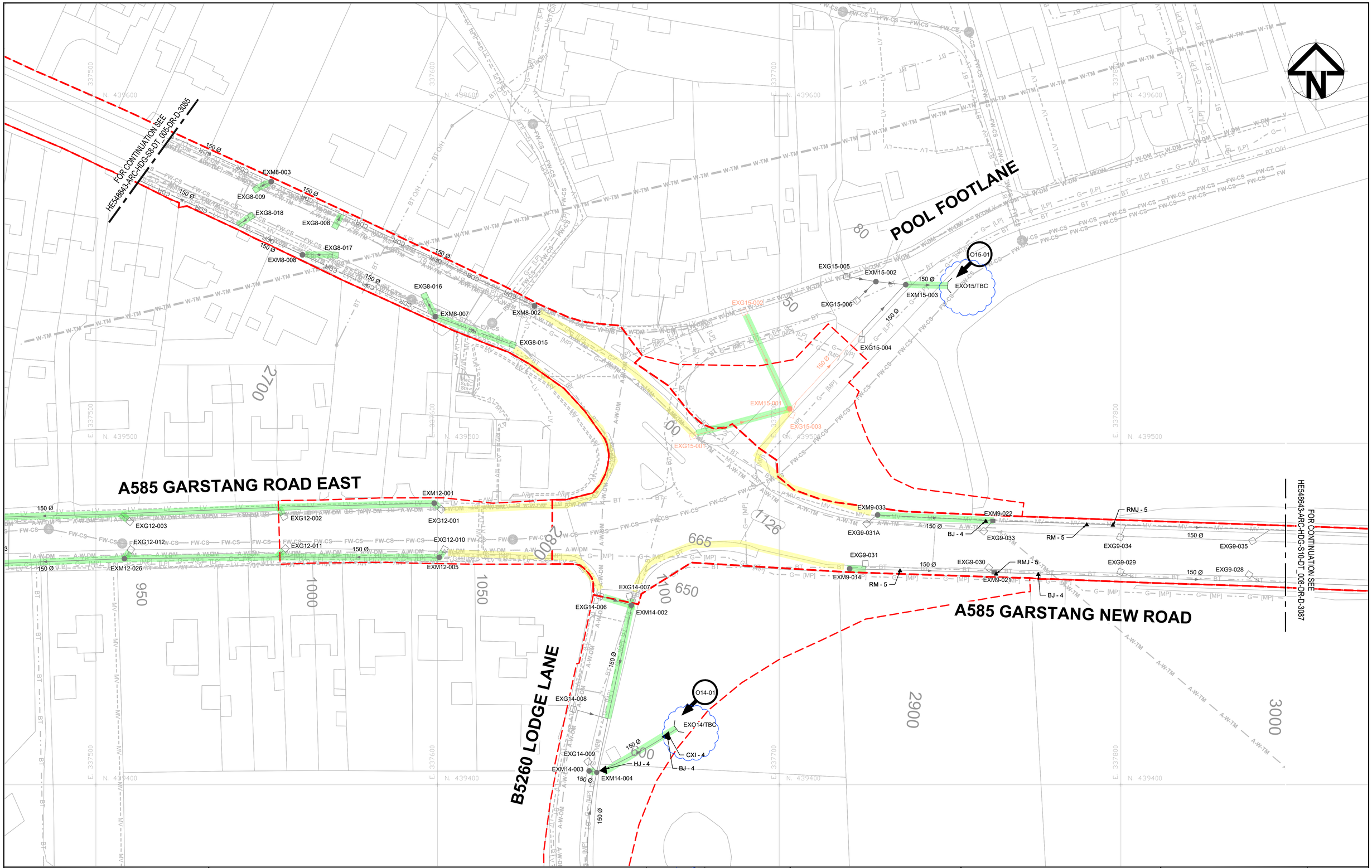
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S8-DT_005-DR-D-3085

100mm on Original

Print Date:

File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 9 OF 20

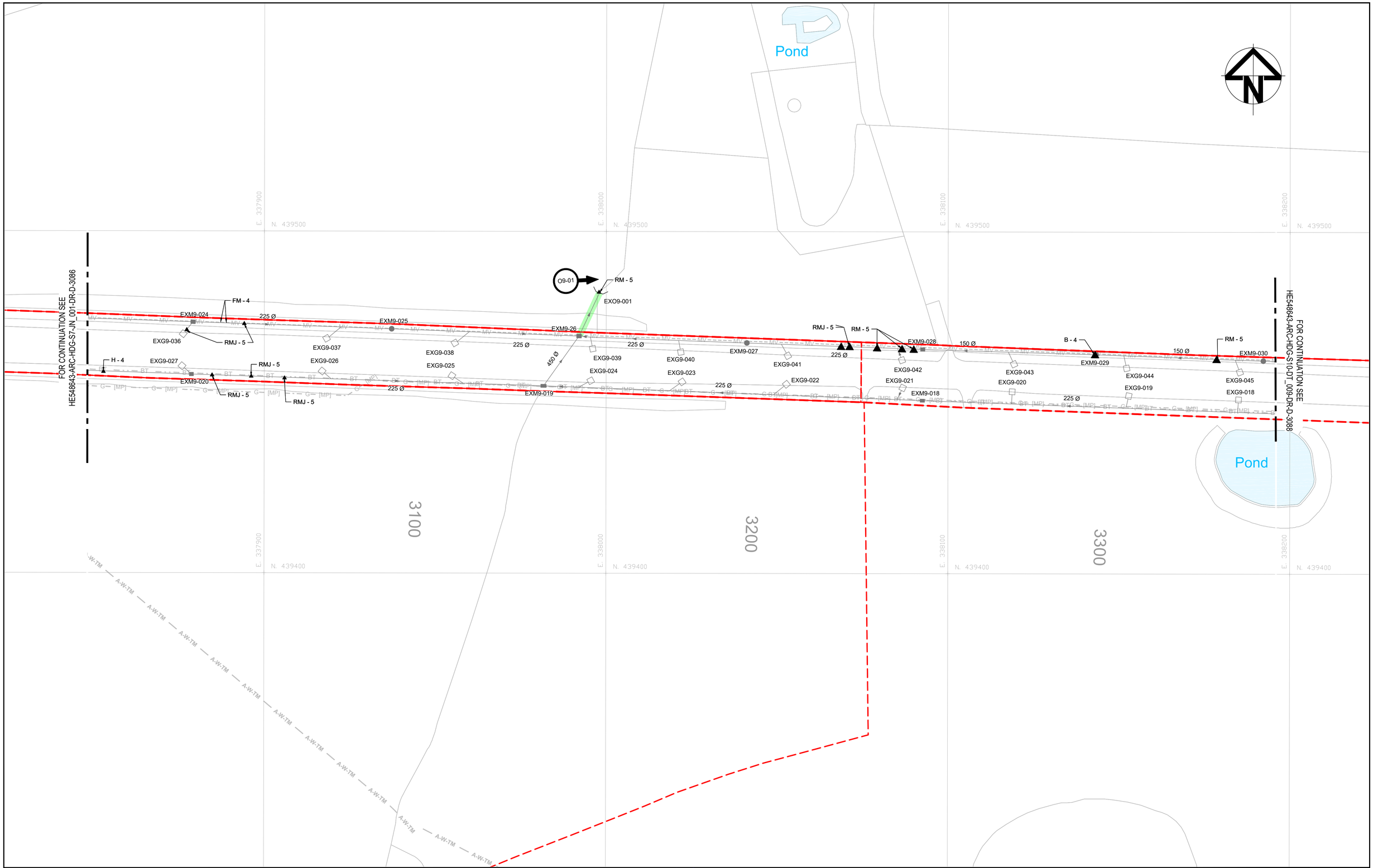
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-HDG-S7-JN_001-DR-D-3086

100mm on Original

Print Date:

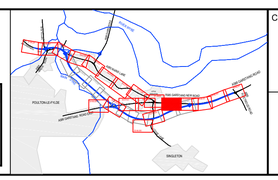
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 10 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

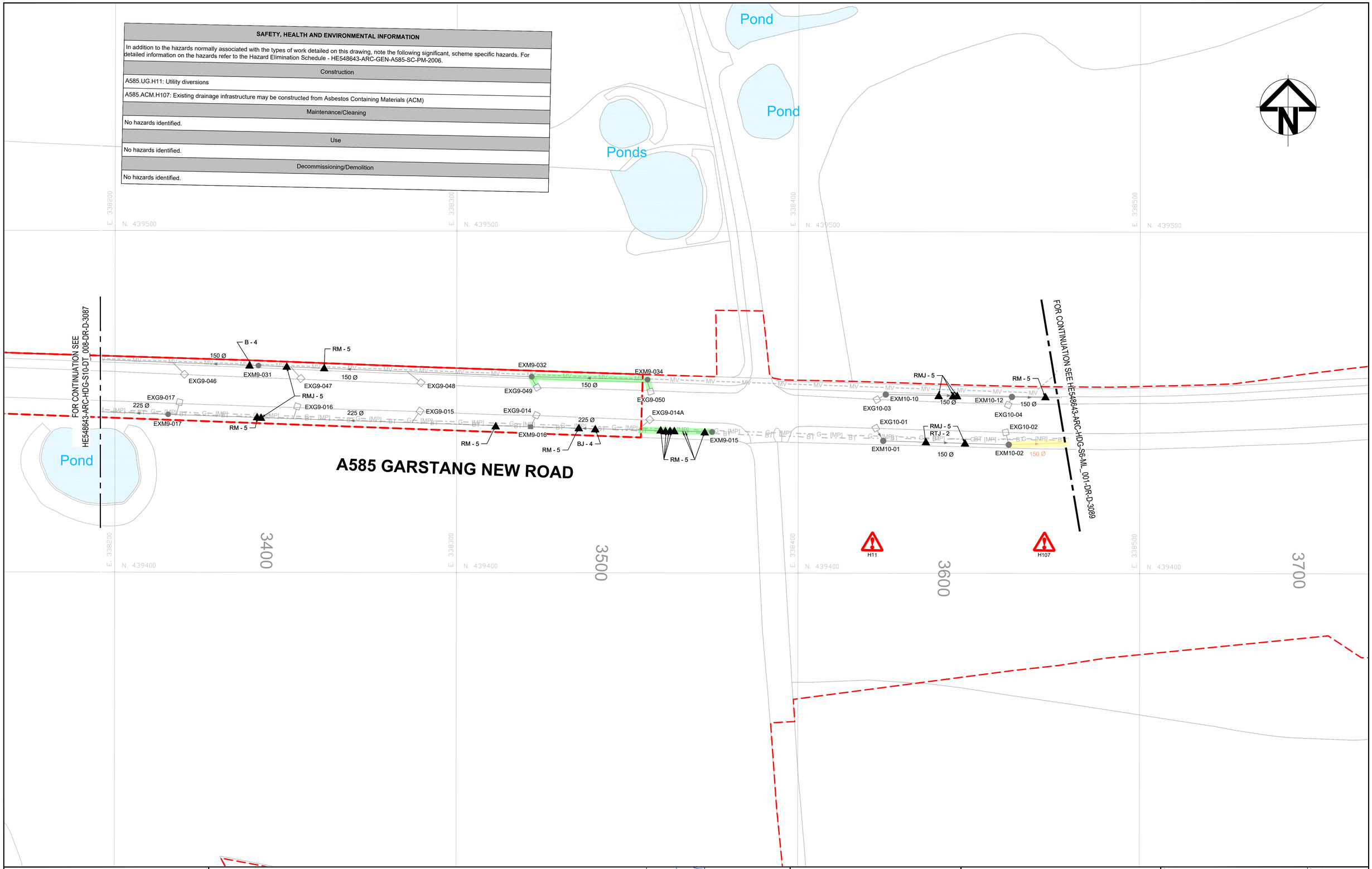
Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S10-DT_008-DR-D-3087

100mm on Original

Print Date:

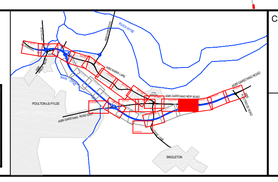
File Path:

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H11: Utility diversions
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

Print Date:

File Path:

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

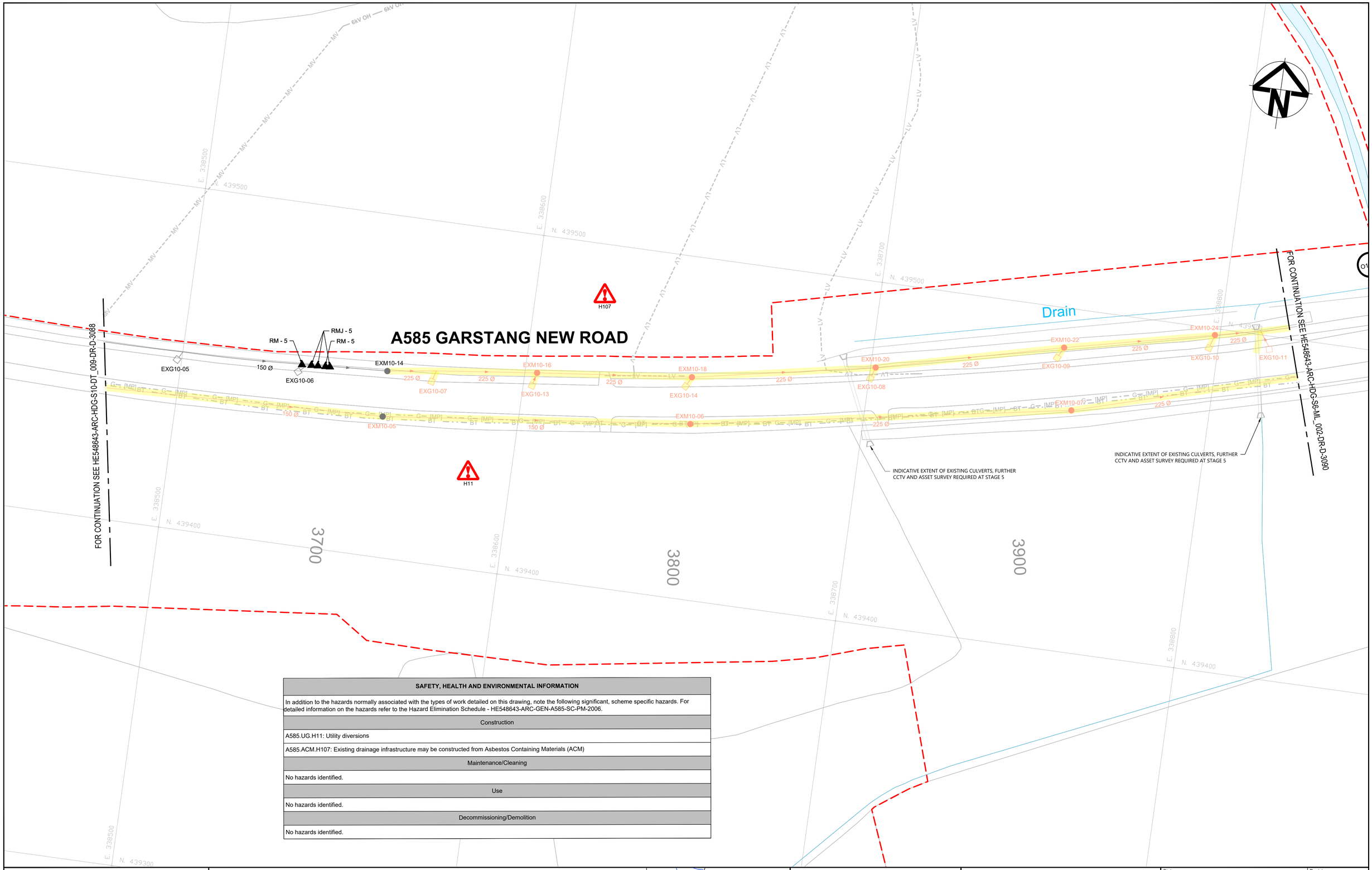
Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 11 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-S10-DT_009-DR-D-3088

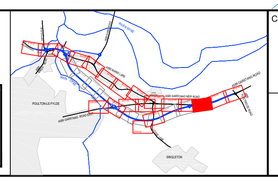


SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H11: Utility diversions
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 12 OF 20

Status: S3 - PRELIMINARY DESIGN

Revision: P02

Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S6-ML_001-DR-D-3089

100mm on Original

Print Date:

File Path:

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H91.Constraint: Existing large drainage and hydrobrake
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
A585.UG.H11: Utility diversions
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

A585 GARSTANG NEW ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-S6-ML_001-DR-D-3089

FOR CONTINUATION SEE HE548643-ARC-HDG-S6-ML_003-DR-D-3091

H91 H107 H11

O10-01 O11-01 EXO11/TBC EXO 10

EXM11-105 EXM11-140 EXM11-093 EXM11-090 EXM11-087

EXC11-103 EXC11-102 EXC11-101

EXG11-092 EXG11-089 EXG11-086

EXG11-098 EXG11-096 EXG11-094

EXG10-12 EXM10-28 EXM10-08 EXG11-139 EXG11-106 EXC11-138

EXG11-136 EXG11-134 EXG11-132 EXG11-129 EXG11-127 EXG11-125 EXG11-122 EXG11-120 EXG11-118 EXG11-116

EXC11-131 EXC11-128 EXC11-124

D - 5

225 Ø 300 Ø 375 Ø 750 Ø 150 Ø

CKD [MP] G BT

INDICATIVE EXTENT OF EXISTING CULVERTS, FURTHER CCTV AND ASSET SURVEY REQUIRED AT STAGE 5

4000 4100 4200 4300

Pond Pond Pond Drain

E 338900 E 339000 E 339100 E 339200

N 439400 N 439500 N 439600 N 439700

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 13 OF 20

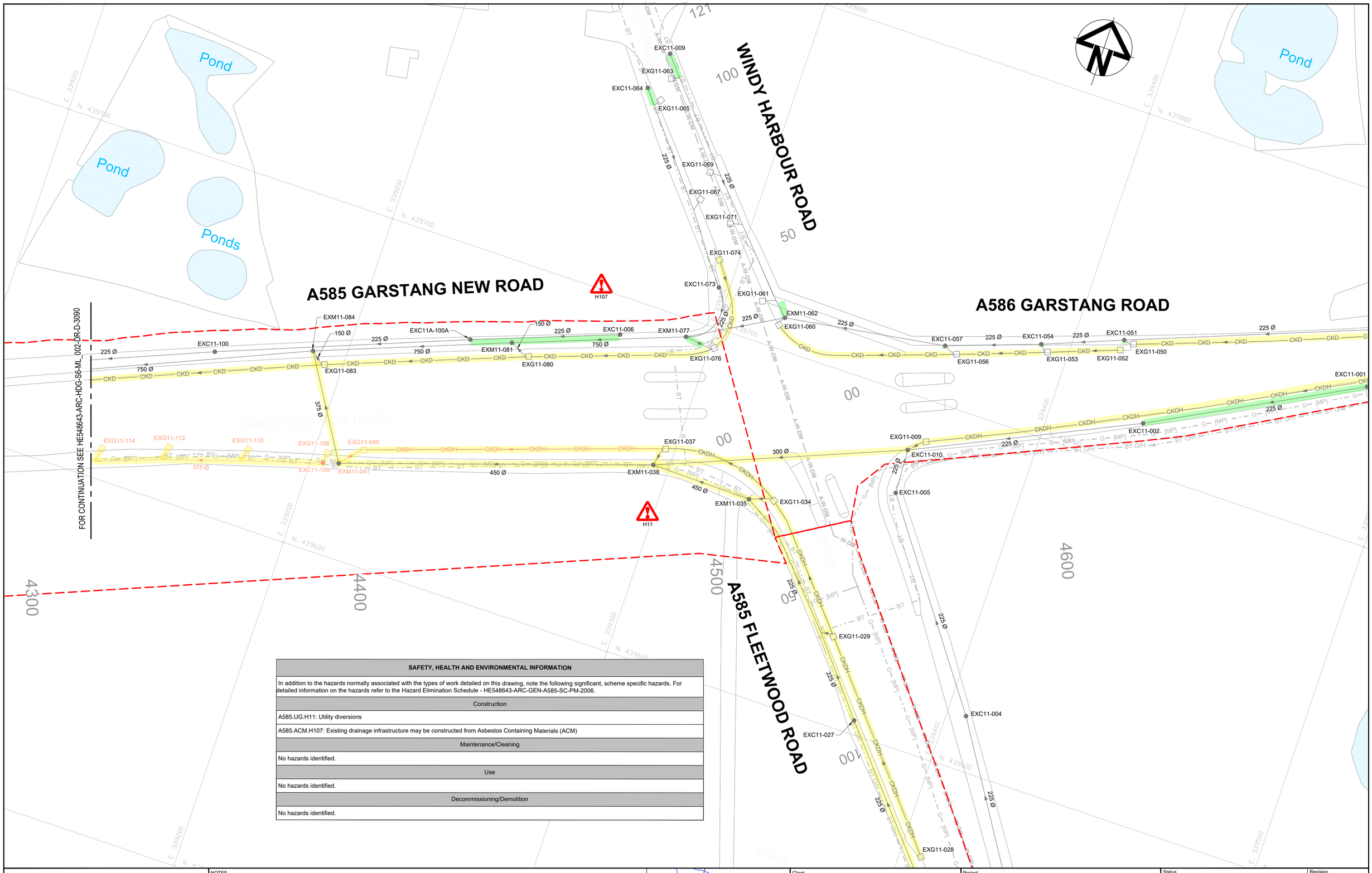
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE548643-ARC-HDG-S6-ML_002-DR-D-3090

100mm on Original

Print Date:

File Path:

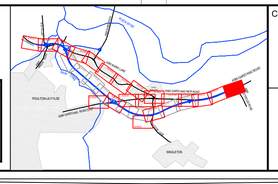


SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H11: Utility diversions
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 14 OF 20

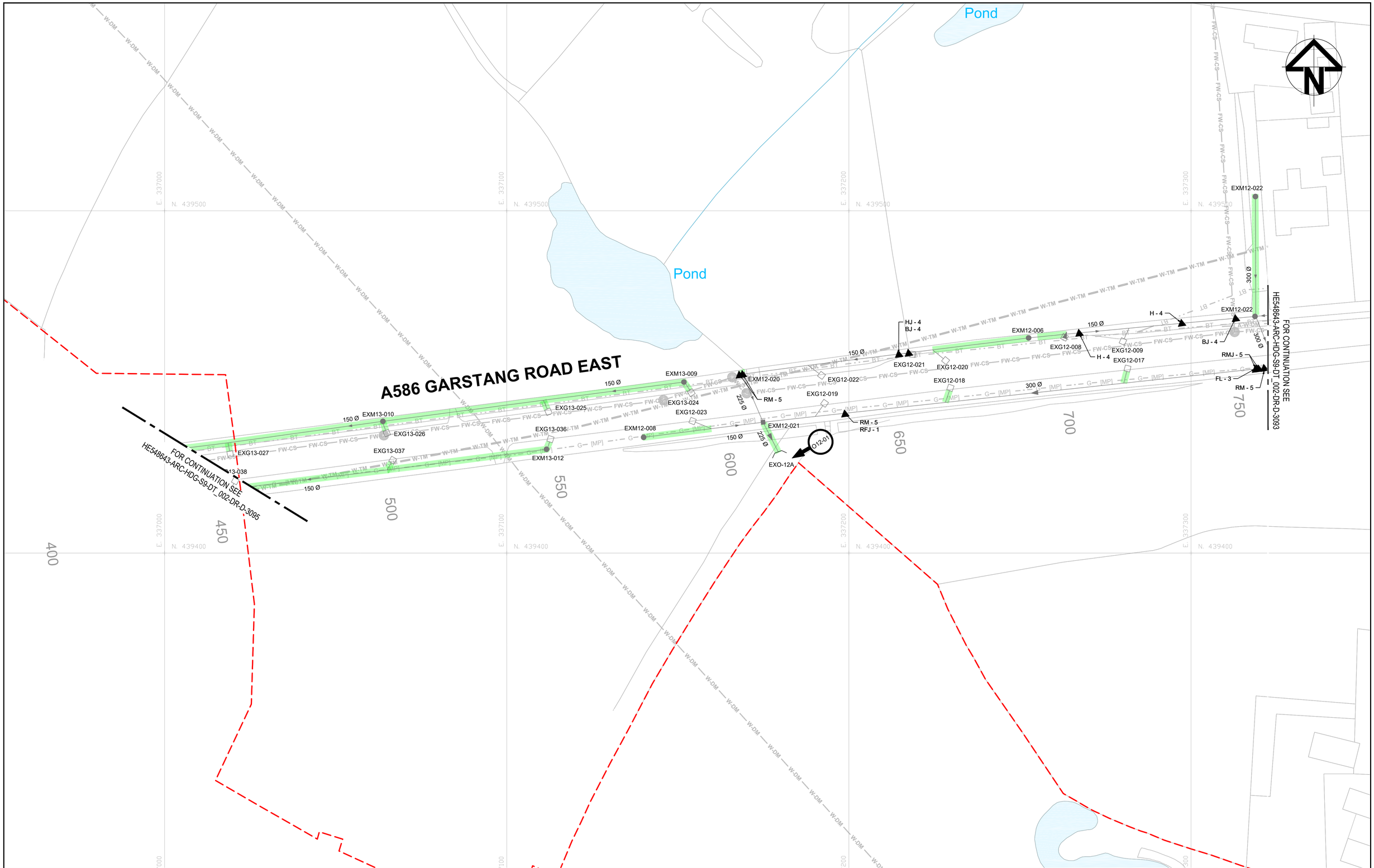
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S6-ML_003-DR-D-3091

100mm on Original

Print Date:

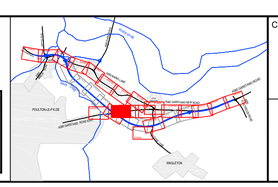
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 15 OF 20

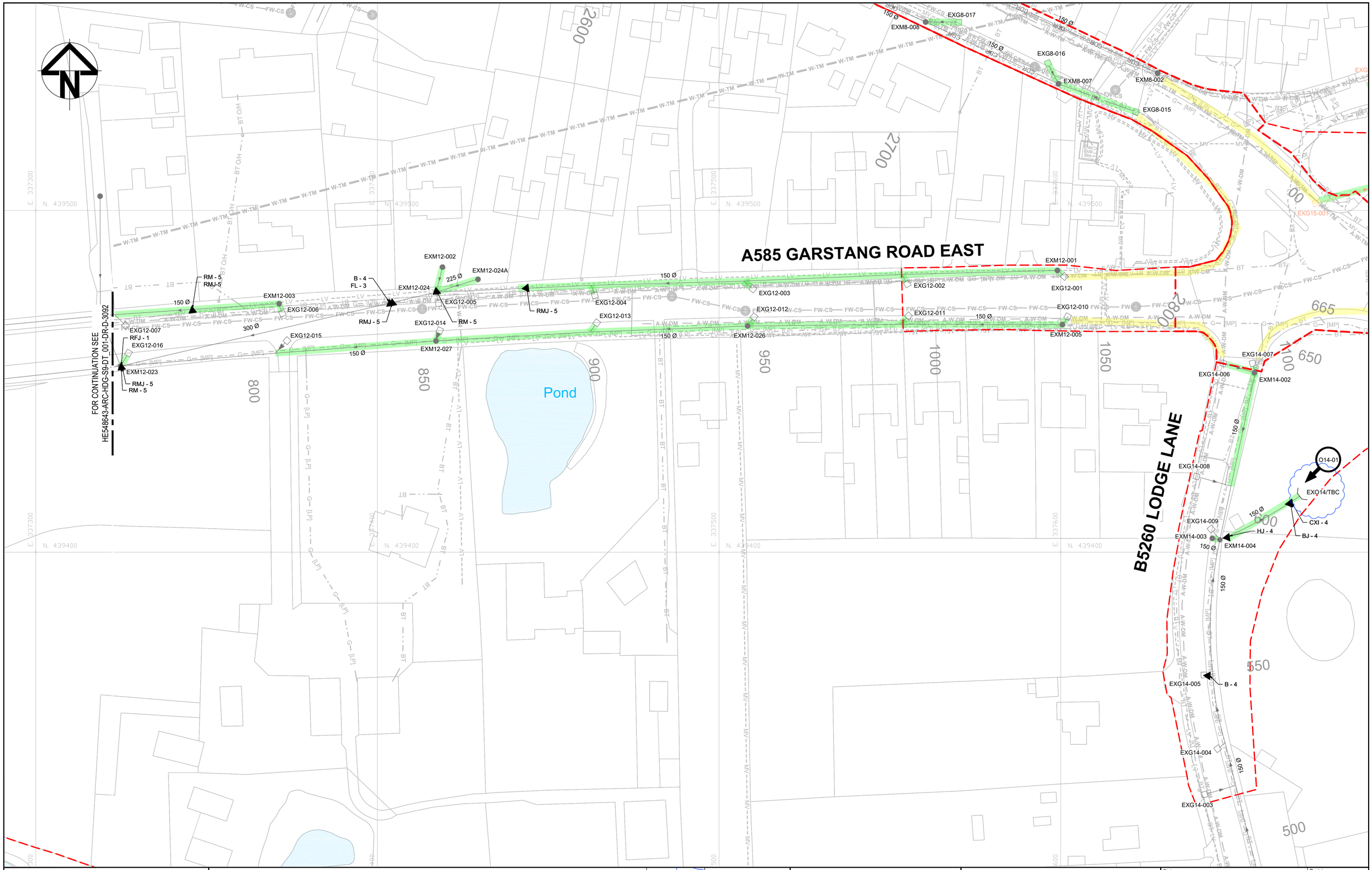
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S9-DT_001-DR-D-3092

100mm on Original

Print Date:

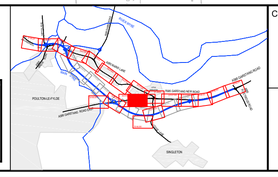
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 16 OF 20

Status: S3 - PRELIMINARY DESIGN | Revision: P02

Scale	1:500
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Date	10JUL2018
Original Size	A1

Drawing number: HE548643-ARC-HDG-S9-DT_002-DR-D-3093

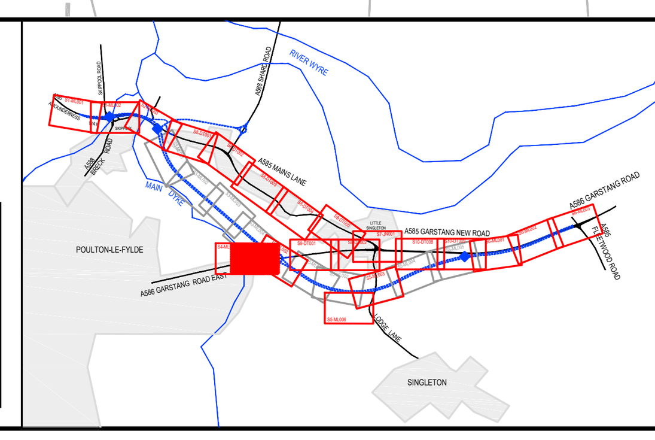
100mm on Original

Print Date:

File Path:

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client
highways england
ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

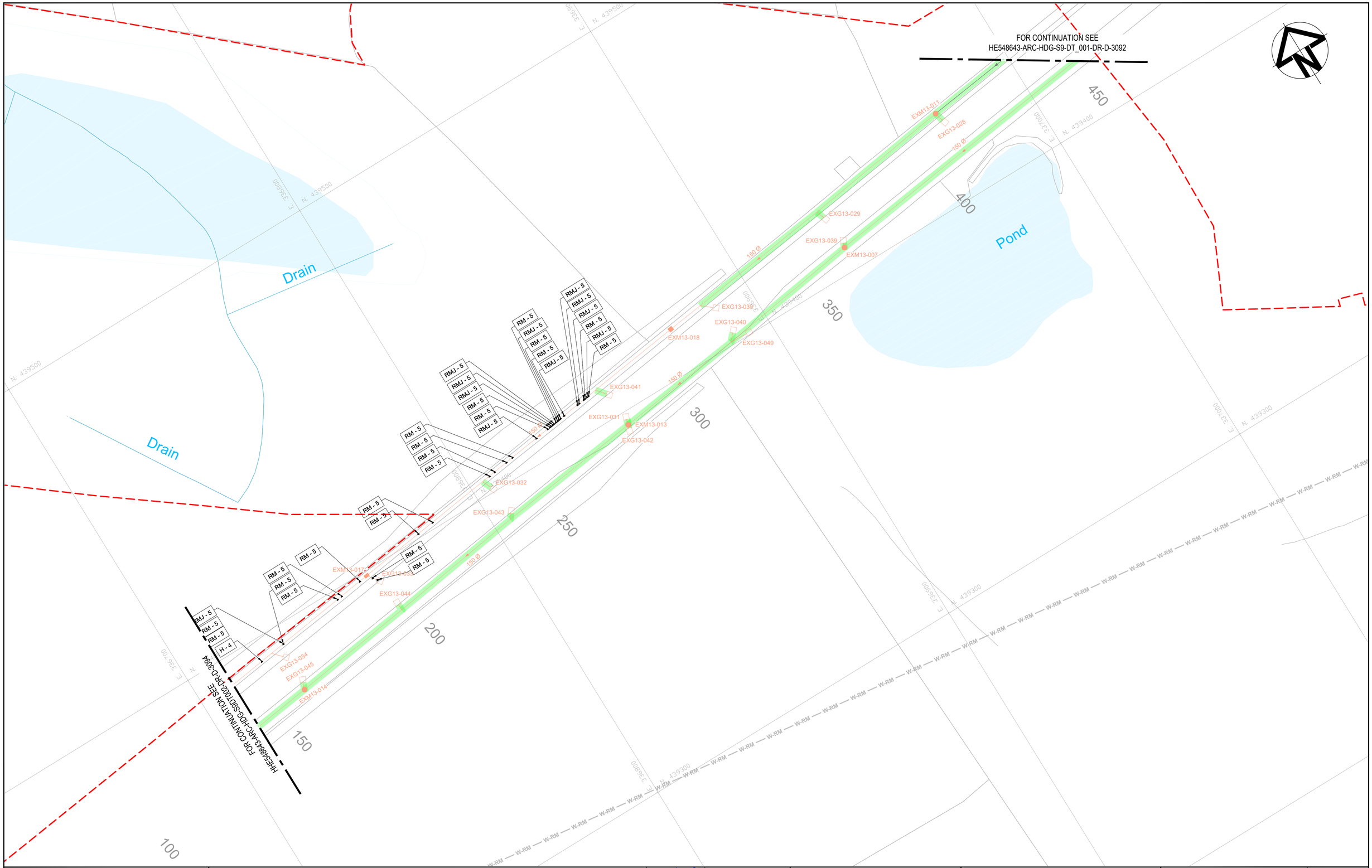
Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 17 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
HE PIN / Originator	HE548643 / ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-S4_ML_001-DR-D-3094

100mm on Original

Print Date:

File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 18 OF 20

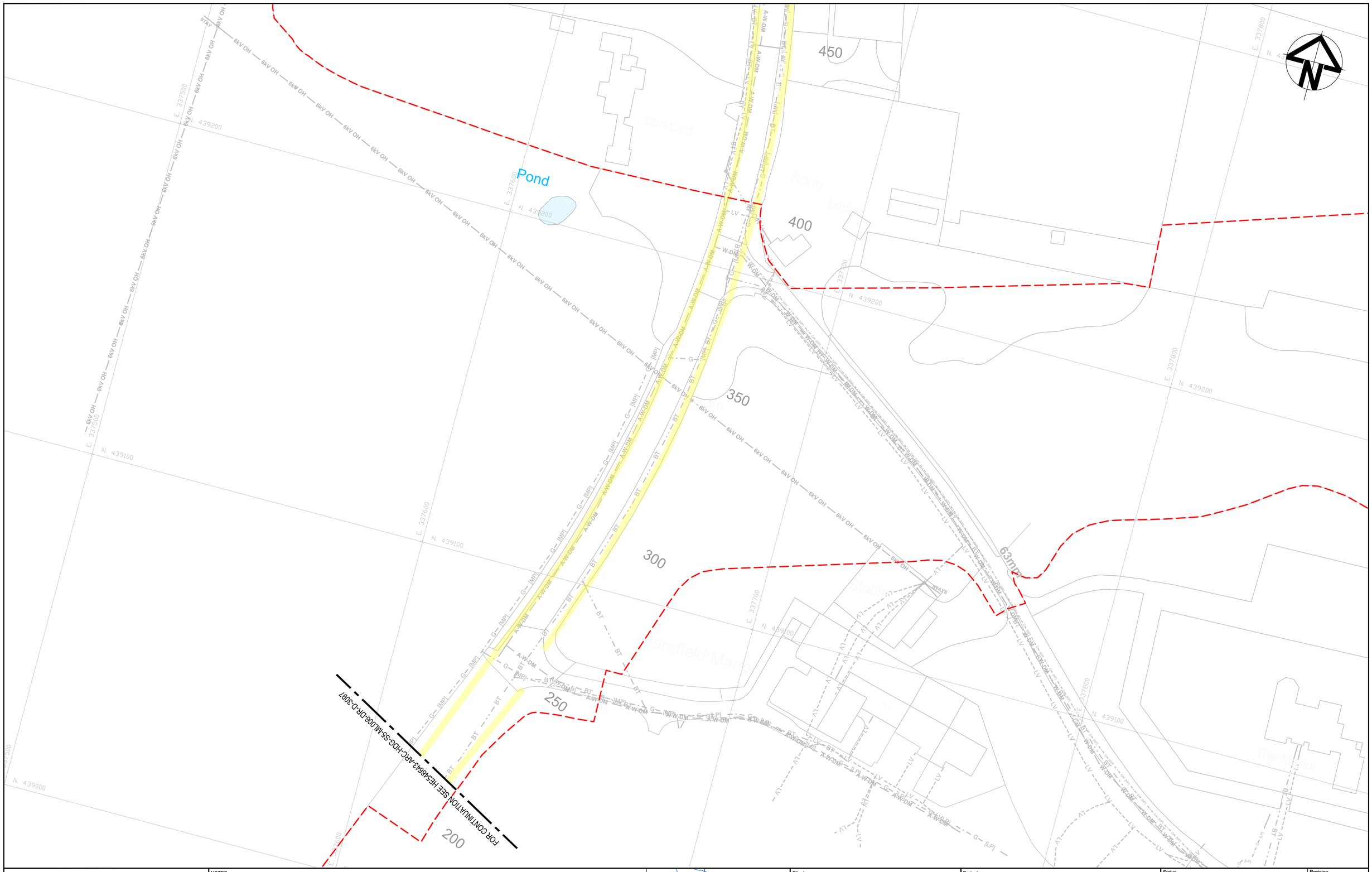
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
HE548643 ARC	Original Size A1

Drawing number: HE548643-ARC-HDG-S4_ML_002-DR-D-3095

100mm on Original

Print Date:

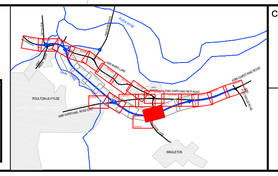
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
The Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN PLAN SHEET 19 OF 20

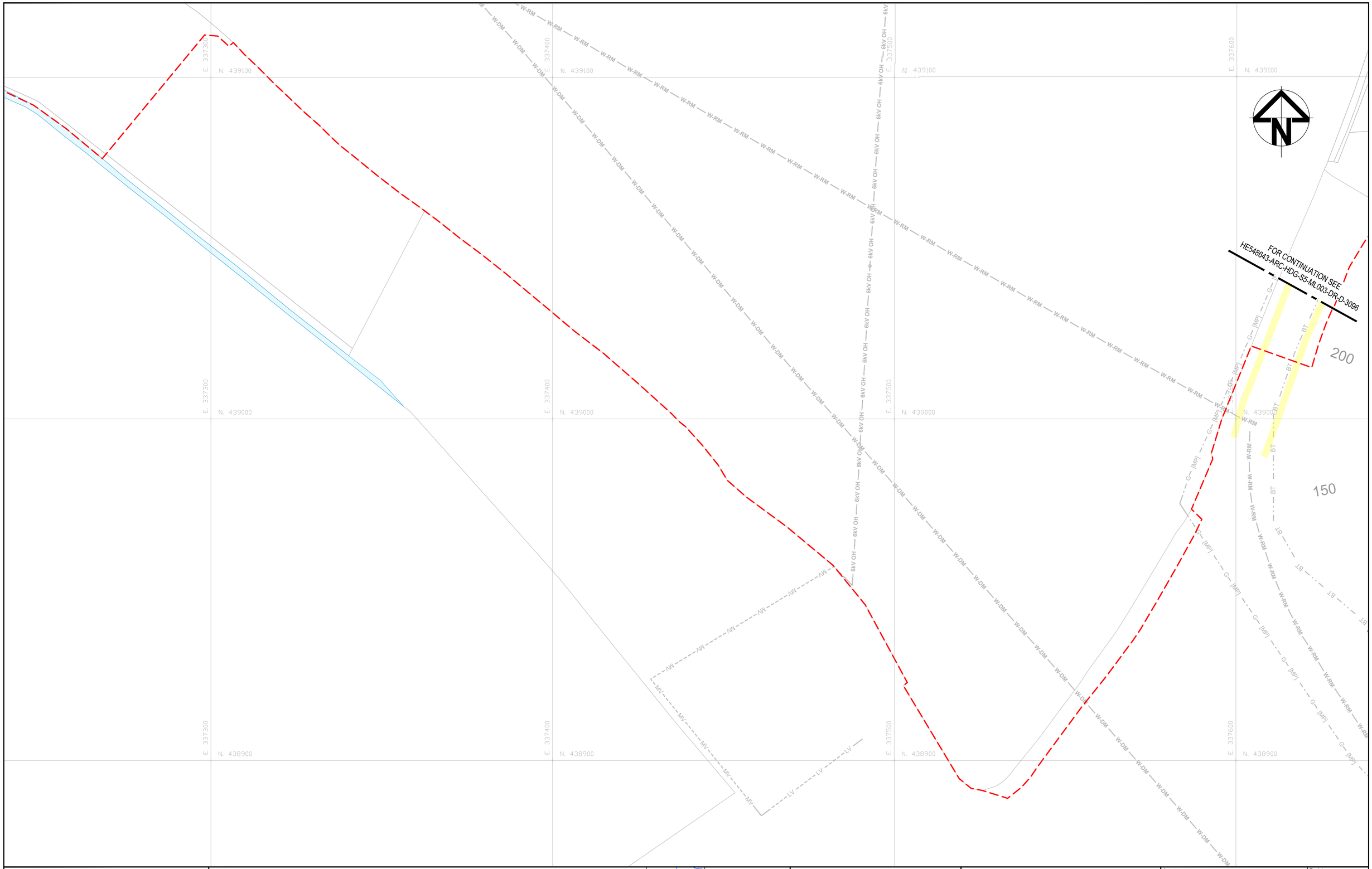
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S5-ML003-DR-D-3096

100mm on Original

Print Date:

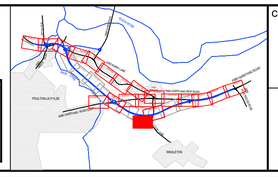
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3076



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: EXISTING DRAINAGE AND SITE CLEARANCE PLAN PLAN SHEET 20 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-S5-ML006-DR-D-3097

100mm on Original

Print Date:

File Path:

Appendix E – Priority outfall register extract

Priority Outfall Register Extract

Asset ID 34853

Outfall Register

Outfall Register ID	34853
HD43 asset ref	SD3540_4552b
Baseline Category	D (Low)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	D (Low)
Proposed solution	
Actual solution	Not yet built
Last updated	28/06/2014

Asset ID 34855

Outfall Register

Outfall Register ID	34855
HD43 asset ref	SD3540_4861b
Baseline Category	D (Low)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	D (Low)
Proposed solution	
Actual solution	Not yet built
Last updated	28/06/2014

Asset ID 34854

Outfall Register

Outfall Register ID	34854
HD43 asset ref	SD3540_4861a
Baseline Category	D (Low)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	D (Low)
Proposed solution	
Actual solution	Not yet built
Last updated	28/06/2014

Asset ID 34851

Outfall Register ID	34851
HD43 asset ref	SD3540_7556c
Baseline Category	D (Low)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	D (Low)
Proposed solution	
Actual solution	Not yet built
Last updated	28/06/2014

Outfall Register

Asset ID 34852

Outfall Register ID	34852
HD43 asset ref	SD3540_7656a
Baseline Category	D (Low)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	D (Low)
Proposed solution	
Actual solution	Not yet built
Last updated	28/06/2014

Outfall Register

Asset ID 32992

Outfall Register ID	32992
HD43 asset ref	SD3839_6948a
Baseline Category	C (Moderate)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	C (Moderate)
Proposed solution	
Actual solution	Not yet built
Last updated	17/05/2013

Outfall Register

Asset ID 13236

Outfall Register ID	13236
HD43 asset ref	SD3839_8150d
Baseline Category	C (Moderate)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	C (Moderate)
Proposed solution	
Actual solution	Not yet built
Last updated	16/06/2010

Outfall Register

Asset ID 32966

Outfall Register ID	32966
HD43 asset ref	SD3839_8151a
Baseline Category	C (Moderate)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	C (Moderate)
Proposed solution	
Actual solution	Not yet built
Last updated	17/05/2013

Outfall Register

Asset ID 32964

Outfall Register ID	32964
HD43 asset ref	SD3839_8551g
Baseline Category	C (Moderate)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	C (Moderate)
Proposed solution	
Actual solution	Not yet built
Last updated	17/05/2013

Outfall Register

Asset ID 32965

Outfall Register

Outfall Register ID	32965
HD43 asset ref	SD3839_8552a
Baseline Category	C (Moderate)
Spillage risk	Not determined
EQS	Not determined
Soluble pollution	Not determined
Sediment pollution	Not determined
Deposition Index	0
Verification status	Baseline assessment carried out
Action status	Not determined
Overall risk status	C (Moderate)
Proposed solution	
Actual solution	Not yet built
Last updated	17/05/2013

Appendix F – Correspondence

A585 Skippool to Windy Harbour Improvement Scheme – Drainage S.E.S Scheme Introduction Presentation

15th November 2017/ 9:30am

Arcadis House, kings Cross Office – Room 2.6

Attendees:

Alan Cope (AC) – Arcadis Consulting – Drainage Lead
Lina Ar'ar (LA) – Arcadis Consulting – Drainage Senior Engineer
Quentin Dawson (QD) – Highways England – S.E.S Department
Santi Santhalingham (SS) – Highways England – S.E.S Department

Apologies:

Nick Henderson – Arcadis Consulting – Project Manager
Andy Bailey – Highways England – S.E.S Department
David Hopkins – Highway England – Scheme Project Manager

Item no.	Notes/actions	Action owner
1	**Introduction**	-
1.1	AC stated that the purpose of the meeting was to introduce the A585 Skippool to Windy Harbour Improvement Scheme and discuss the existing water environment, existing highway drainage and our proposed drainage strategy.	-
1.2	AC stated that do this he had produced a presentation (document number: HE548643-ARC-GEN-A585-PR-ZM-3000). The presentation will cover the following agenda: 1. Location overview; 2. Existing road network and the main constraints; 3. Existing A585 issues; 4. Scheme objectives; 5. Summary of options; 6. Proposed route; 7. Existing overland flow catchments; 8. Existing drainage; 9. Proposed drainage strategy; 10. Proposed drainage and catchments; and 11. Proposed Departures.	-
2	**Agenda items 1 to 6**	
2.1	AC gave a brief introduction to the scheme explaining that the Preferred Route Announcement (PRA) had been issued on 24th October 2017 and the preliminary design (Stage 3) for the scheme was being developed to set the red line boundary ready for the Development Control Order (DCO).	-
2.2	SS emphasized it is not within the remit of Highways England S.E.S department to approve any proposed drainage design, rather they are here to advise and provide necessary guidance.	-
3	**Agenda item 7 - Existing overland flow catchments**	
3.1	AC stated that there are 4no. Main Rivers within the scheme extents, these being the River Wyre, Horsebridge Dyke, Main Dyke and Pool Foot Creek.	-
3.2	AC stated that a Flood Risk Assessment was being produced and discussions had been held with the Environment Agency with regards the effect of the proposed embankment on the fluvial and tidal flood zones.	-
3.3	QD asked if any local watercourses were to be culverted.	-
3.4	AC explained that 5no. new 1.5m diameter culverts would be required along the offline bypass and the extension of 2no. existing 900mm diameter culverts to accommodate the dualling of the existing carriageway at Windy Harbour Junction.	-

3.5	QD asked if the culverts were included in the FRA and what their effect was on the tidal flooding.	-
3.6	AC stated that the culverts and proposed wetlands were included in both the fluvial and tidal models.	-
3.7	QD enquired about the effect this had on the fluvial and tidal flood water levels.	-
3.8	AC stated that as part of the scheme the existing Skippool Bridge was going to be replaced and 2no. structures constructed. The new structures would be larger clear span structures (bridge / box culverts) which actually reduced the flood water levels, even though the new embankment took up floodplain storage. AC stated that this will all form part of the FRA.	-
3.9	AC stated that due to the anticipated ground conditions the culverts are likely to be constructed from twin wall thermoplastic pipes. This is to cater for the anticipated differential settlement of 150mm at the culvert headwalls and 300mm at the midpoint.	-
3.10	SS stated that all pipes greater than 900mm diameter are classified as a structure. SS also stated that he was currently developing the detailed specification for thermoplastic pipes in the MCHW to include pipes greater than 900mm diameter.	-
3.11	AC stated that he had been asked a question by the Structures S.E.S department via the Arcadis structures team with regards fire protection of thermoplastic twin wall pipes used as culverts	-
3.12	SS stated that if the culvert is open at both ends i.e. no trash or security screens and it only takes overland flow i.e. no road drainage, then the risk of a fire starting is negligible.	-
3.13	AC confirmed this to be the case and already stated this in his response to the structures team.	-
4	**Agenda item 8 – Existing drainage**	
4.1	AC explained that there was limited existing drainage data available and gap analysis plans had been created along with an CCTV asset and condition survey specification to allow asset data to be gathered to confirm our current design.	-
4.2	AC explained that the existing drainage networks along the existing A585 utilised kerb and gullies, which discharge via carrier drains to the ditches and ultimately the watercourses.	-
4.3	QD asked what would happen to the existing A585 when are scheme was complete.	-
4.4	AC stated that the existing A585 would be de-trunked and given to Lancashire County Council (LCC).	-
4.5	QD asked if the existing drainage on the de-trucked section was in good condition.	--
4.6	AC stated that we have limited information and the gap analyses included the de-truckned section. AC stated that the team was aware that LCC may ask for defects to be repaired prior to them accepting ownership.	-
4.7	AC stated that apart from the Windy Harbour Junction improvement works where an oversized pipe and penstock value had been installed, the remainder of the existing drainage catchments current have no form of attenuation, water quality treatment or accidental spillage control.	-
5	**Agenda items 9 & 10 – Proposed drainage strategy and catchments**	
5.1	AC stated that all existing drainage catchments had been hydraulically modelled based on eth 1 in 1, 5 and 100 year return periods, and where we planned to re-use existing outfalls the existing 1 in 5 year discharge rate would be maintained.	-
5.2	SS stated that modelling of the existing 1 in 5 year discharge rate should not include the 20% climate change allowance.	-
5.3	AC stated that the existing hydraulic modelling did not include an allowance for climate change.	-
5.4	networks as per HD33 and the National Planning Policy Framework (NPPF) i.e. Table 5 of the Guidance Note in NPPF states that a scheme with a design life extending to a point earlier than 2085 should adopt 20%.	-

Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall Intensity	*5%*	*10%*	*20%*	*30%*
Peak river flow	*10%*	*20%*		
Offshore wind speed	*5%*		*10%*	
Extreme wave height	*5%*		*10%*	

(Table 5 extract from Technical guidance to NPPF (DCLG – 2012))

<table>
<tr><td>5.5</td><td>SS and QD stated that the relevant NPPF Guidance note on Climate Change factors has been withdrawn on March 2014 and replaced with new guidance on flood risk assessments: climate change allowances and that an upper end allowance of 40% is now recommended.

Post Meeting Note:
Current government guidance on climate change allowances are provided in Table 2 as shown below:

Table 2: peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)<table><tr><th>Applies across all of England</th><th>Total potential change anticipated for the '2020s' (2015 to 2039)</th><th>Total potential change anticipated for the '2050s' (2040 to 2069)</th><th>Total potential change anticipated for the '2080s' (2070 to 2115)</th></tr><tr><td>Upper end</td><td>10%</td><td>20%</td><td>40%</td></tr><tr><td>Central</td><td>5%</td><td>10%</td><td>20%</td></tr></table></td><td>-</td></tr>
<tr><td>5.6</td><td>AC stated that a 40% allowance had not been incorporated and as the scheme was already over budget with a low CBR, it would be unlikely that 40% could be included.</td><td></td></tr>
<tr><td>5.7</td><td>SS / QD requested that a 40% sensitivity check is undertaken, and the results reported back to them.

Post Minute Note:

A 40% sensitivity test had been undertaken on the proposed catchments on the offline bypass i.e. new catchments with new outfalls. The check has confirmed that there is sufficient capacity within the currently designed wetlands to accommodate the 40% and this allowance would be accommodated for catchments 4,5 6 and 7 only. Catchment 1,2 3 and 8 utilise existing outfalls and the 40% allowance will not be accommodated.</td><td>AC</td></tr>
<tr><td>5.8</td><td>AC stated that pre-earthworks ditches and filter drains would be used to drainage third party run-off and these would be kept separate from the surface water drainage systems.</td><td>-</td></tr>
<tr><td>5.9</td><td>AC stated that a separate filter drain system would be incorporated in the mainline verges and central reserve at lodge lane cutting to accommodate the potential high groundwater flows. AC stated that we have no Ground Investigate (GI) data at the moment, but the geology in the area suggest that groundwater flows could be high, so the design has progressed on a worst-case basis.</td><td>-</td></tr>
<tr><td>5.10</td><td>QD asked what would happen if the flow rates were found to be low.</td><td>-</td></tr>
<tr><td>5.11</td><td>AC stated that as the scheme was only at stage 3, once the GI came in, the design could be updated accordingly.</td><td>-</td></tr>
<tr><td>5.12</td><td>AC stated that at the junctions / tie in locations kerb and gullies or combined kerb and drainage units (CDKU) had been used. On the mainline bypass concrete triangular Surface Water Channel SWC) had been adopted (1.28m wide in the verge and 1.58m wide in the central reserve).</td><td>-</td></tr>
<tr><td>5.13</td><td>SS asked why grassed channels hadn't been used.</td><td>-</td></tr>
<tr><td>5.14</td><td>AC confirmed that the maintaining agents normal reject the use of grass channels has they require the grass to be cut and can they can become easy damaged if they are tracked by errant vehicles. AC stated that the drainage design was based on providing the most efficient / safe solution which required the minimum amount of maintenance.</td><td>-</td></tr>
<tr><td>5.15</td><td>QD asked why we had used a triangular channel and not a trapezoidal channel as they have a greater hydraulic capacity</td><td>-</td></tr>
<tr><td>5.16</td><td>AC stated that on previous scheme the maintaining agents had requested triangular channel over trapezoidal channels as they required greater passes with the road sweeper to clean, which had health and safety implications for the operatives.</td><td>-</td></tr>
<tr><td>5.17</td><td>AC stated that the scheme had 7no. catchments which would increase to 9no. catchments if Shard Link Road was included in the scheme.</td><td>-</td></tr>
<tr><td>5.18</td><td>AC stated that catchments 1,2 and 3 utilised existing outfalls and would be drained via kerb and gullies or combined kerb and drainage units (CDKU). These would discharge through carrier drains and oversized pipe would be used for attenuation with a penstock and orifice plate for spillage containment and flow control. A vortex grit separator has been installed upstream of the attenuation pipe to removed sediment. The new bridges have a 1m hard strip and due to the cross fall and longitudinal fall no bridge deck drainage is required. Gullies will be provided upstream and downstream of the bridge.</td><td>-</td></tr>
<tr><td>5.19</td><td>AC stated that catchment 4 to 7 used SWC which discharges to a carrier system, prior to discharge to a wetland which will provide water quality treatment and accidental spillage containment. The</td><td>-</td></tr>
</table>

	wetland forebay has been replaced with a vortex grit separate to capture sediment and floatables as they have a smaller footprint and are easier to clean.	
5.20	AC stated that catchment 8 covered existing Lodge lane which will now be on a bridge over the mainline. No drainage is required on the bridge. The small catchment upstream of the bridge will be connected into the pre-earthworks ditch. The catchment downstream of the bridge will connect into the existing drainage system following verification by CCTV asset and condition survey. Lodge lane is a local authority road and discussion are to be held with LCC.	-
5.21	AC stated that catchment 9 covers Shard Link Road which is drained by a SWC discharging to a wetland. There is still debate if this link road will be included in the scheme. **Post Minute Note:** Shard Link Road has been removed from the scheme following a written instruction from Highways England (17/11/2017)	-
5.22	AC confirmed that: ▪ Oversized pipes are designed to accommodate the 1 in 5 years storm return period with the discharge restricted to existing discharge rates (1 in 5 year flow rates); ▪ Wetlands had been designed to accommodate 1 in 100 year storm event with a 20% allowance for climate change with the discharge restricted to greenfield run-off rates; ▪ Wetlands located in flood zones protected against the 1 in 100 year fluvial flood level (300mm free board); and ▪ Wetland maintenance access provided off network (where possible).	-
6	**Agenda Item 11 – Proposed departures**	
6.1	AC stated that 3no. drainage departures will be applied for on the scheme, these being: ▪ Surcharging of the drainage networks during 1 in 1 year storm events; ▪ Increased spacing for man access chambers from a maximum of 100m to 150m; and ▪ Increase the diameter of a Type 7 catch-pit from 1050m diameter to accommodate larger pipes.	-
6.2	SS stated that these are now common departures and in principle these will be approved.	-
6.3	SS also confirmed that a departure will be required for the use of the vortex grit separator as the standard is still in draft format.	AC
6.4	SS confirmed that in principle they had no objections to the drainage proposals	-
7	**Post Meeting Note**	**-**
	Following issue of the draft minutes by AC, Highways England felt it would be beneficial in the longer term if a post meeting note to the MoM regarding climate change design requirements was added and is as follows: When it comes to Design of Road Drainage HE advises that designers would normally be expected to adopt the following approach: ▪ All edge drain details for collection of run off and carrier pipes/conduits for conveyance of that run off shall be designed based on the 'rainfall' experienced by the road catchment. River levels and sea levels are not part of this design consideration. However, all drainage design shall incorporate appropriate discharge controls to comply with the national requirements. Highways England fully recognise the design standards described in the National Planning Policy Framework (NPPF) for climate change adaptation. NPPF provides the tools we need to ensure the SRN drainage network can be designed, constructed and operated in a safe way, and in order to	

	meet our legal obligation not to increase the risk of flooding. All new schemes shall adopt the following approach to drainage design: ▪ For all new schemes that do not involve adaptation of an existing drainage network: Full compliance with the requirements described in NPPF; ▪ For all new schemes that involve adaptation of an existing drainage network: Compliance in accordance with HD33, with the exception of Smart Motorways where IAN 161 shall apply; ▪ In both 1 and 2, above, the design solution shall incorporate a 20% uplift in peak rainfall intensity. The proposal shall also sensitivity test the design with a 40% uplift in peak rainfall intensity. The difference between the 2 scenarios (Central and Upper) shall enable the end user to understand the range of impact between the climate change risk scenarios. In the light of this knowledge the Project Sponsor shall determine the appropriate course of action to be implemented; ▪ For all schemes that use existing outfalls, the current discharge rates shall not be exceeded. The current discharge rates (no rates were historically pre-defined, or pre-agreed) shall be calculated using the current design methods available within DMRB 4.2 ▪ All schemes shall be checked for a 1 in 100 year flooding compliance Where rivers and the sea have the potential to influence a highway design the regional effects of climate change must again be taken into account. In this case the impact of climate change on river flows and sea level rise must be taken into account as part of a flood risk assessment. Our HD45 publication, which covers flood risk assessment, signposts the end-user back to Volume 4.2 (HA107) for Culvert design. However, the end user should be aware of, and implement, the most up-to-date climate change guidance to assess risk and design culverts in accordance with the new regional variations defined in NPPF, and to use the higher risk levels when doing so. *Note on Peak Rainfall Intensity allowances: The working assumption is that all new road infrastructure shall have a design lifetime of 60 years. Under the climate change scenarios for peak rainfall intensity described in NPPF Table 2 the design lifetime of new road infrastructure now places them in the "2080s" banding (Note that NPPF Table 2 brackets the "2080s" peak rainfall intensity scenarios over the 2070 to 2115 period). NPPF text on peak rainfall intensity simply states the need to "understand the range of impact" and refers to the Central and Upper values across all of England that will facilitate this understanding. NPPF Table 2 then defines the "2080s" Central and Upper Peak Rainfall Intensity values as 20% and 40%, respectively. It is in this context that HE requirements are defined. You will note that for completely new road drainage designs our requirements are in full accordance with NPPF, whilst ensuring due diligence is exercised when "understanding" and evaluating the potential effects of a changing climate.*	

A585 WINDY HARBOUR TO SKIPPOOL

STAGE 3 PRELIMINARY DRAINAGE DESIGN

HIGHWAYS ENGLAND S.E.S. DRAINAGE DEPARTMENT
INTRODUCTION TO THE SCHEME

HE548643-ARC-GEN-A585-PR-ZM-3001-HE OD Presentation

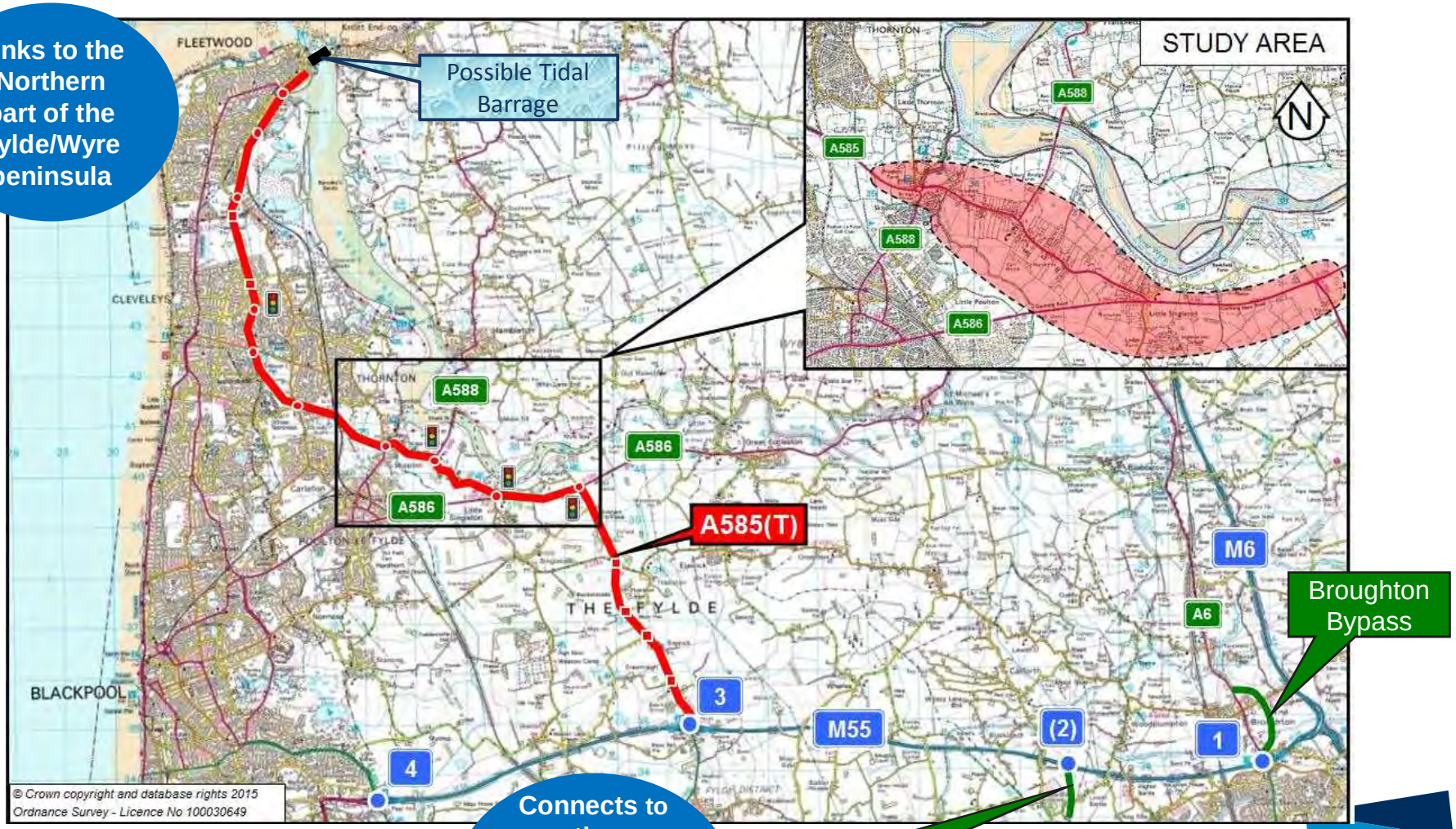
16th November 2017

Presented by: Alan Cope

Agenda

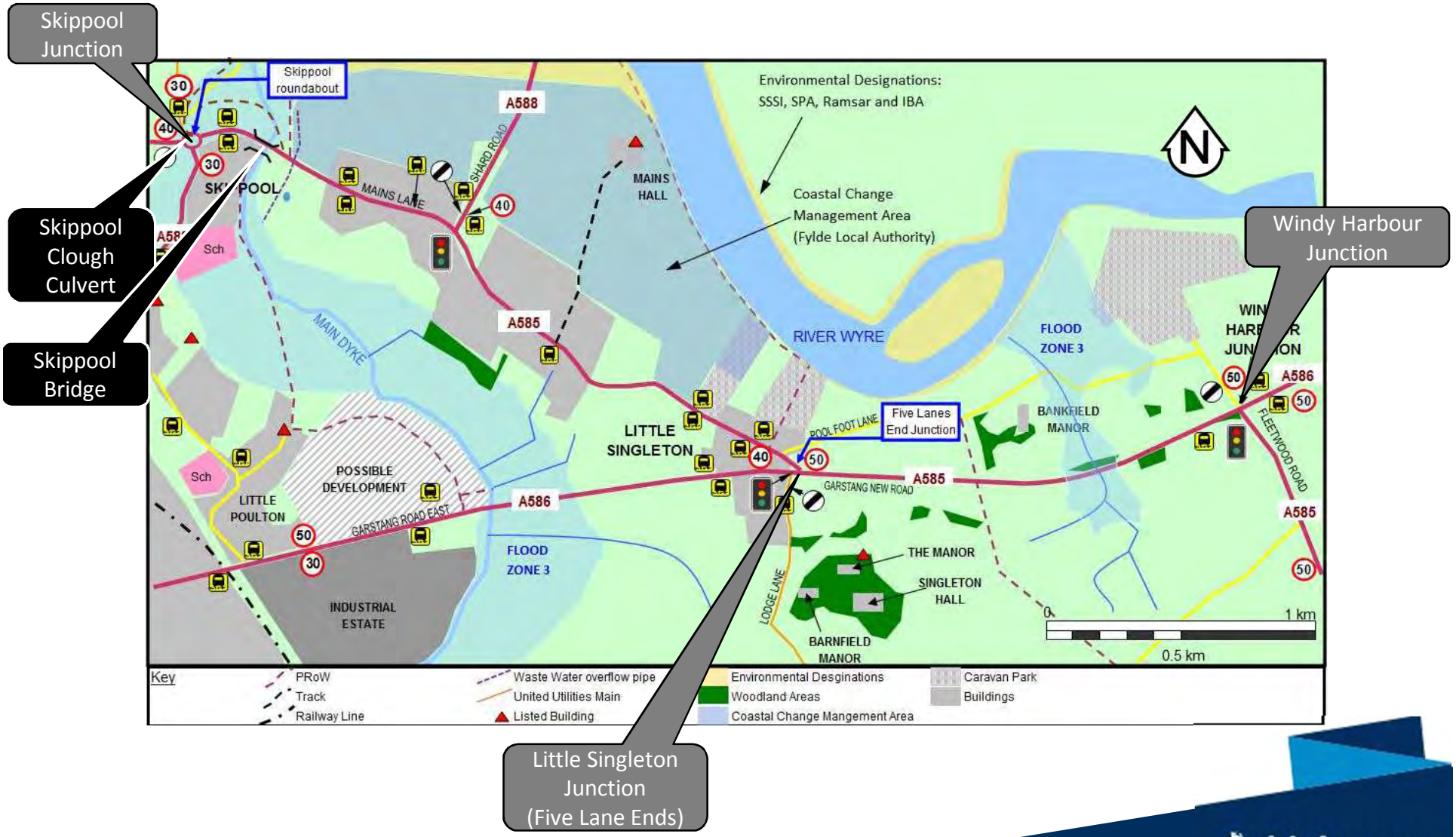
- Location Overview;
- Existing Road Network & Main Constraints;
- Existing A585 Issues;
- Background - existing route;
- Scheme objectives;
- Summary of Options;
- Proposed route;
- Existing overland flow catchments;
- Existing drainage;
- Proposed drainage strategy;
- Proposed drainage and catchments; and
- Proposed departures.

Location Overview



highways england

Existing Road Network & Main Constraints



highways england

Existing A585 Issues

- The Scheme Objective Business case (SOBC) identifies that the A585 is in the worst 10% of routes in the NW for reliability;
- A585 route is ranked 81st and 202nd on national top 250 for casualty rates;
- A585 was not originally constructed to Highways England standards but now forms part of the trunk road network;
- The South Pennines Route Bases Strategy (RBS) highlighted significant issues for cyclists and vulnerable road users. Including difficulties at junctions, difficulties crossing and navigating the road safely and poor maintenance of facilities for cyclists;
- The route runs close to the southern end of Morecambe Bay Estuary which is designated as SAC, Ramsar, SPA and Nature Improvement Area;
- Northern end of Scheme (including Skippool Bridge) and much of the southern bypass route to A586 Garstang Road East are within flood risk areas; and
- Skippool Bridge may have to be raised significantly (subject to discussion with EA).

Background – Existing Route

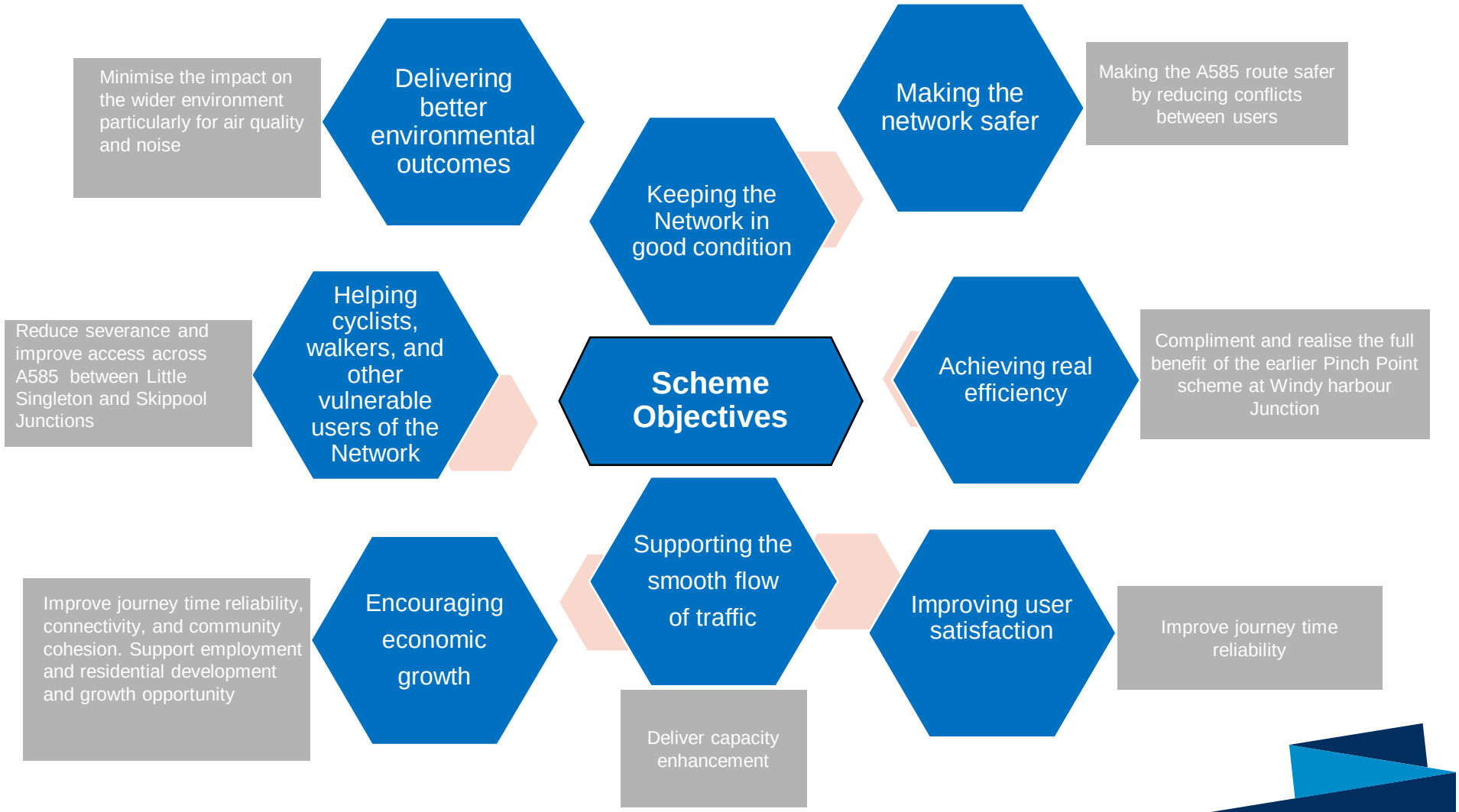
- The existing A585 within the Scheme is a 4.5km long single carriageway with 3 main junctions and extensive ribbon development fronting both sides over 3km of its length;

- A585 Mains Lane has more than 130 properties and 3 caravan parks that have direct access to the road;

- It is also used by several bus routes and has a speed limit of 40mph; and

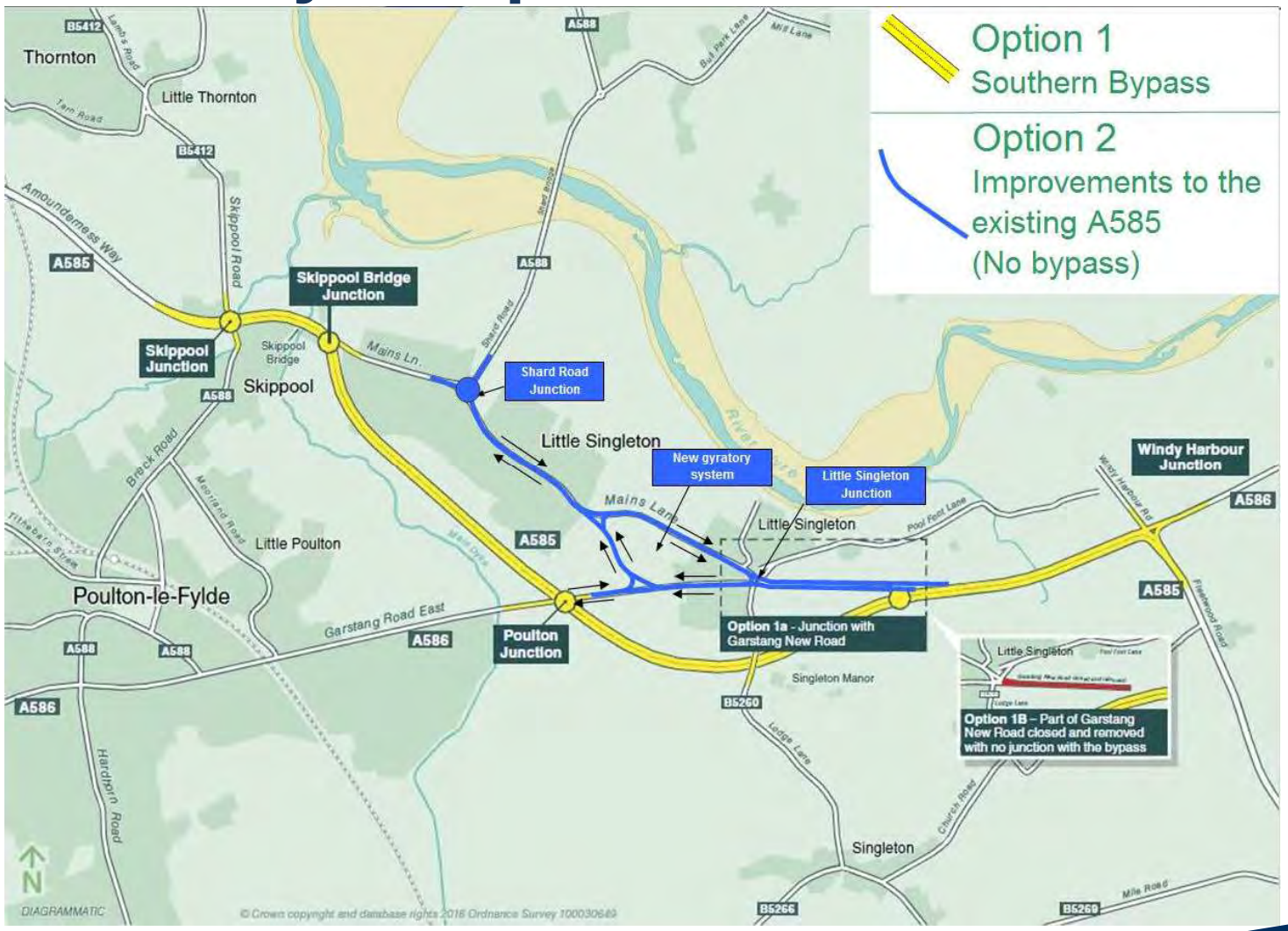
- Skippool bridge, which is over 100 years old (widened in 1920's), would need further widening for dualling and has been fitted with flood containment gates.

Scheme Objectives



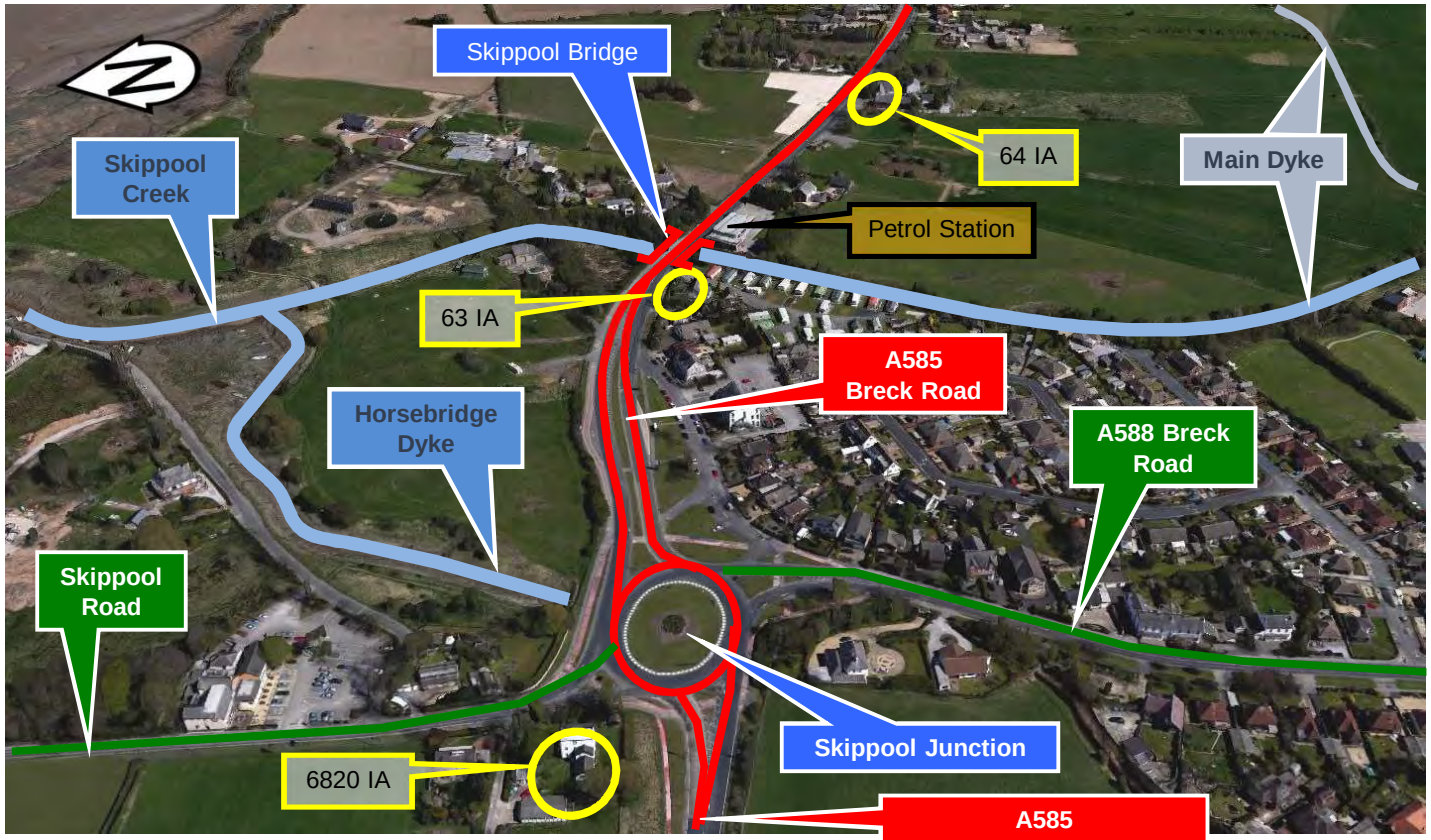
highways england

Summary of Options



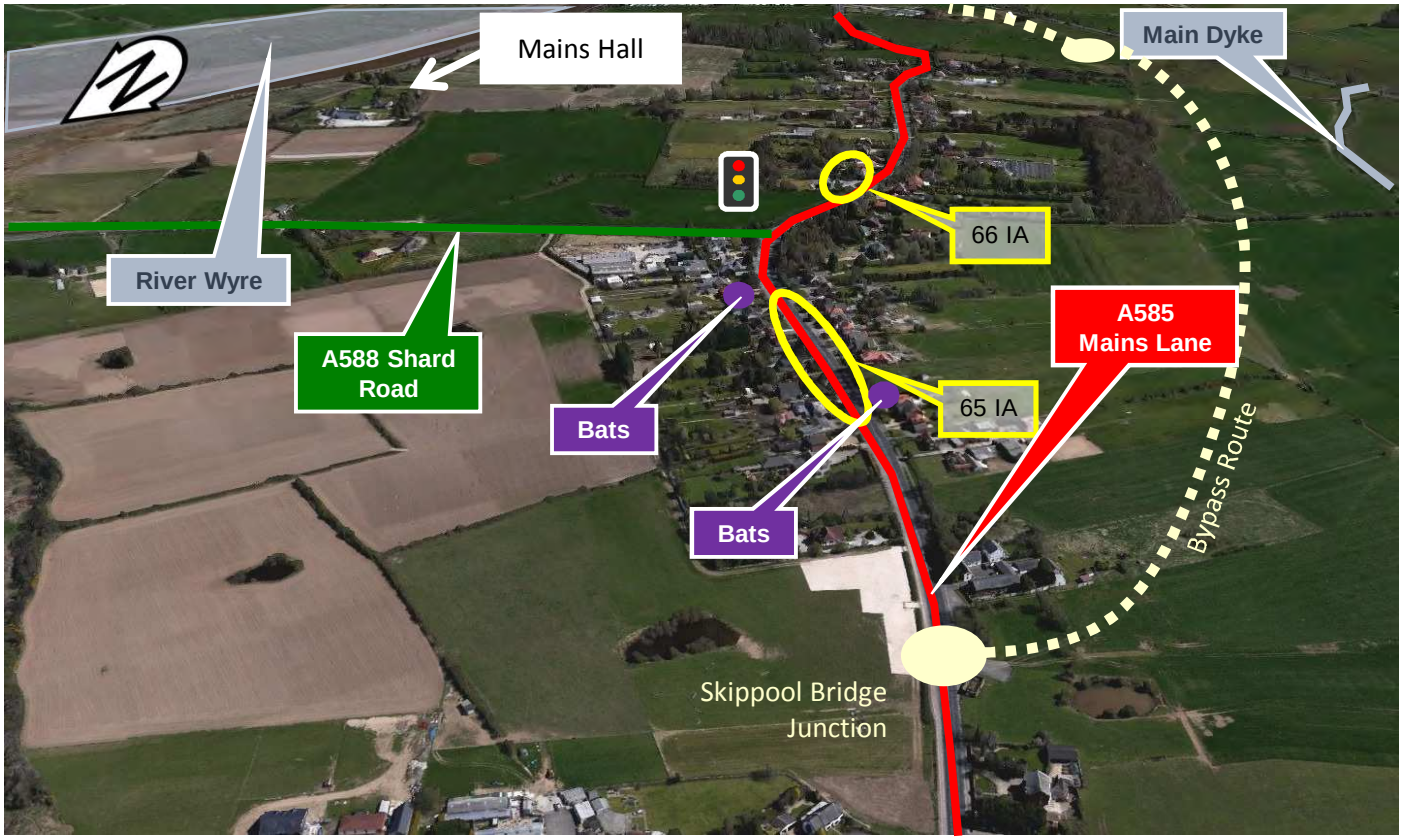
highways england

Skippool Junction and Skippool Bridge



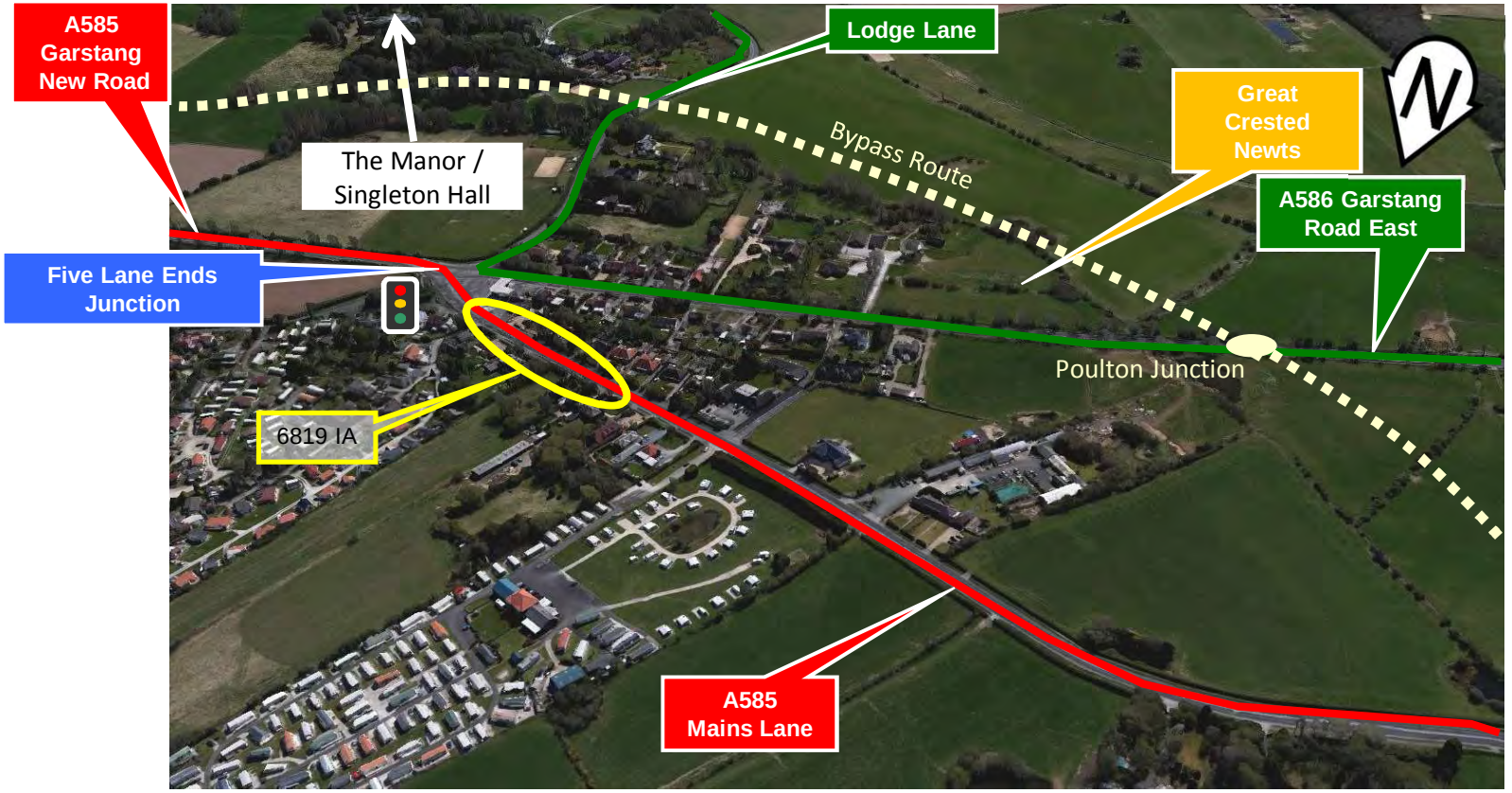
highways england

Skippool Bridge to Shard Road

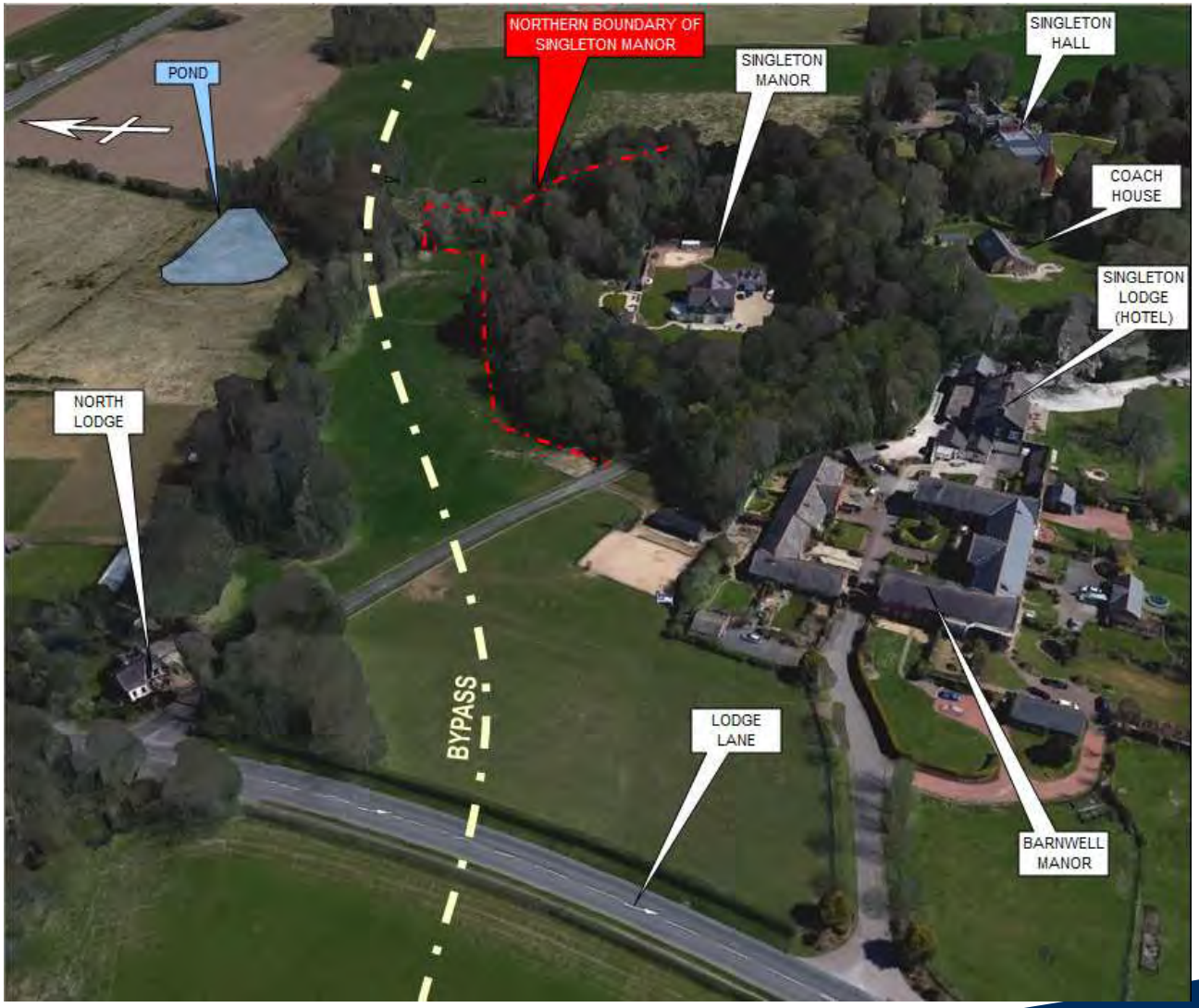


highways england

Little Singleton (Five Lane Ends Junction)

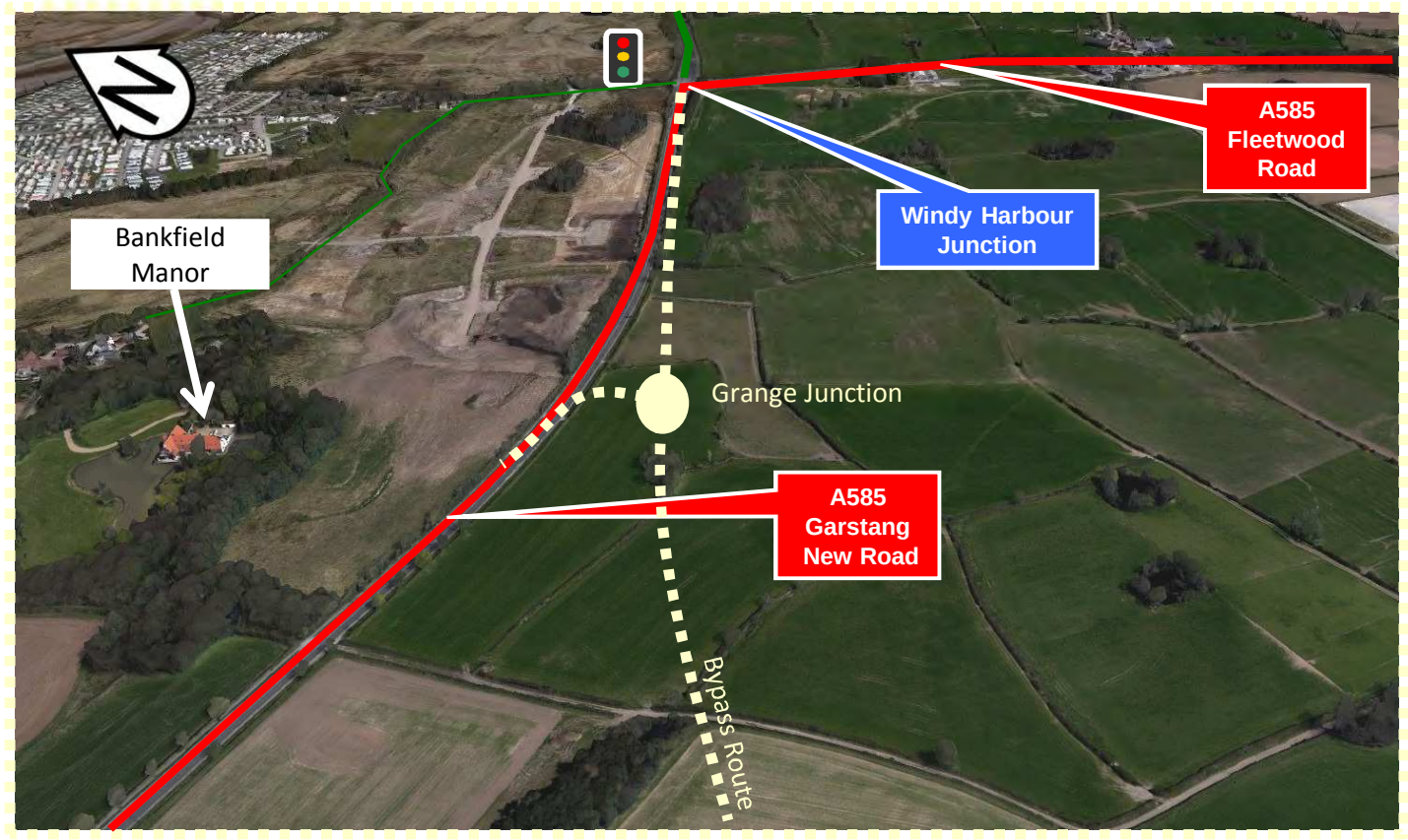


Lodge Lane (looking east)



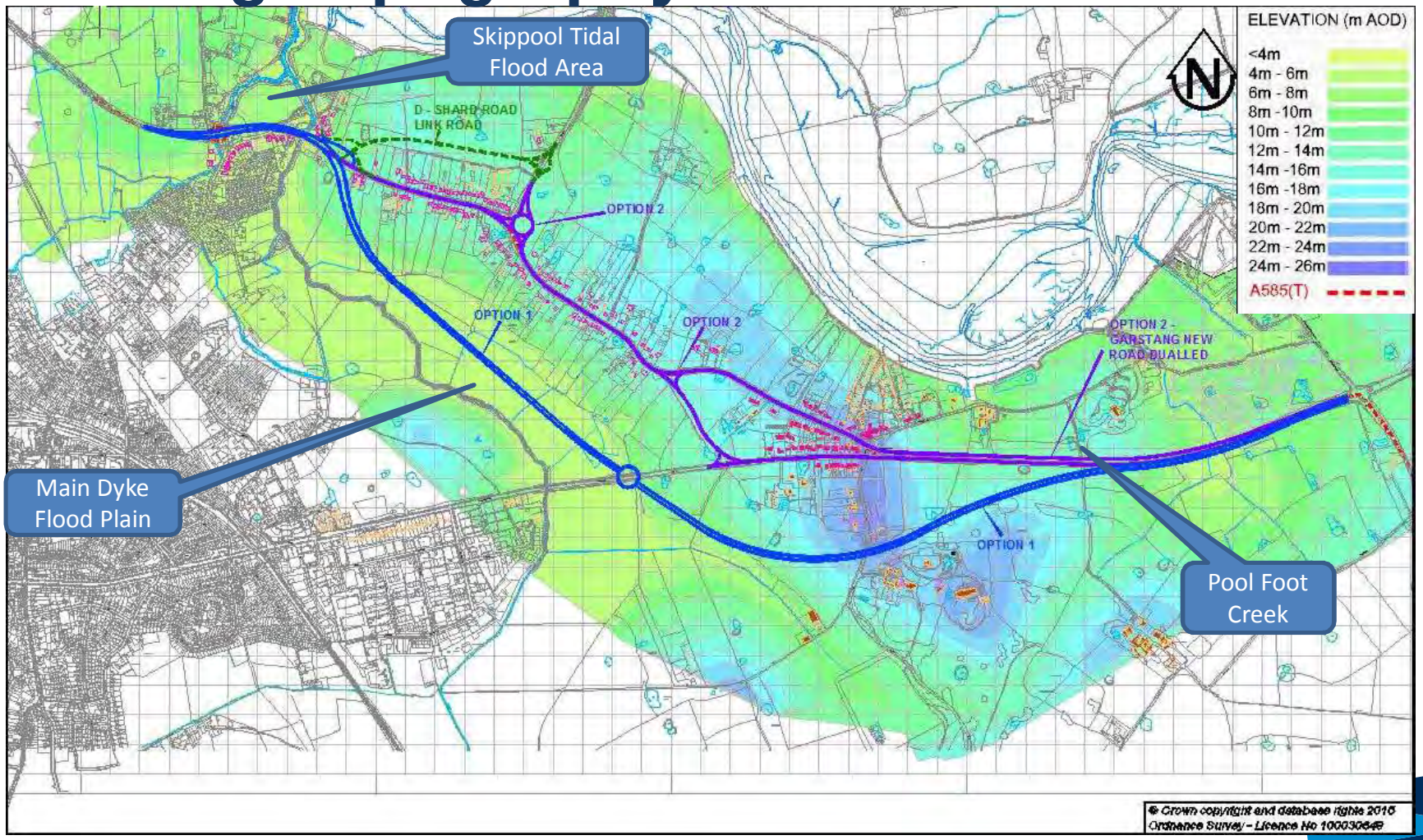
highways england

New Garstang Road and Windy Harbour Junction



highways england

Existing Topography

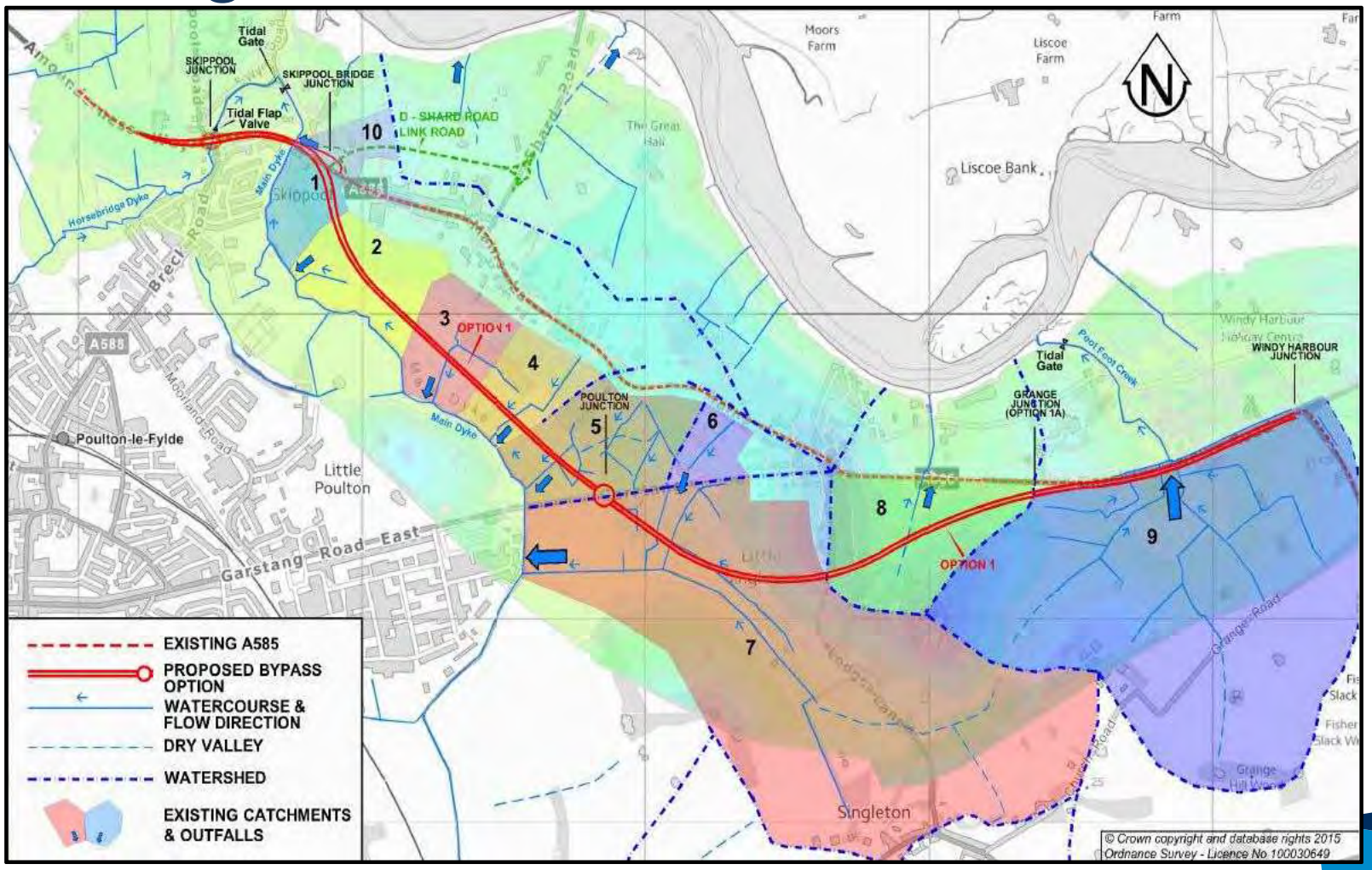


highways england

Existing Drainage – Water Environment

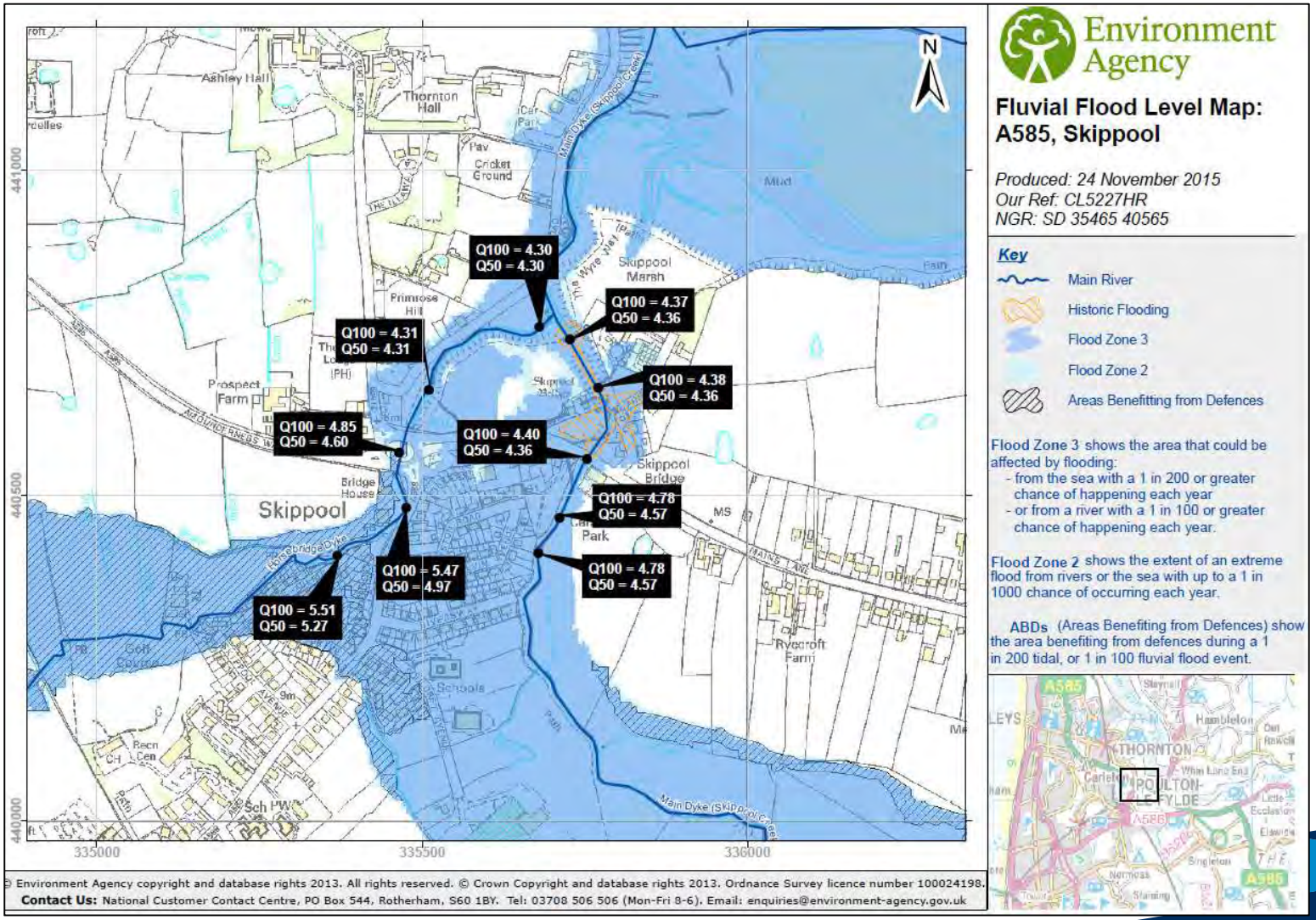
- 3no. Main Rivers (Horsebridge Dyke, Main Dyke and Pool Foot Creek);
- Groundwater condition is unknown – limited GI.
- Groundwater is assumed to be present at Lodge Lane cutting due to the glacial sands / gravel cap; and
- Majority of the scheme is within flood zone 1, with a smaller portion within flood zones 2 and 3.

Existing Overland Flow Catchments



highways england

Existing Drainage – Water Environment

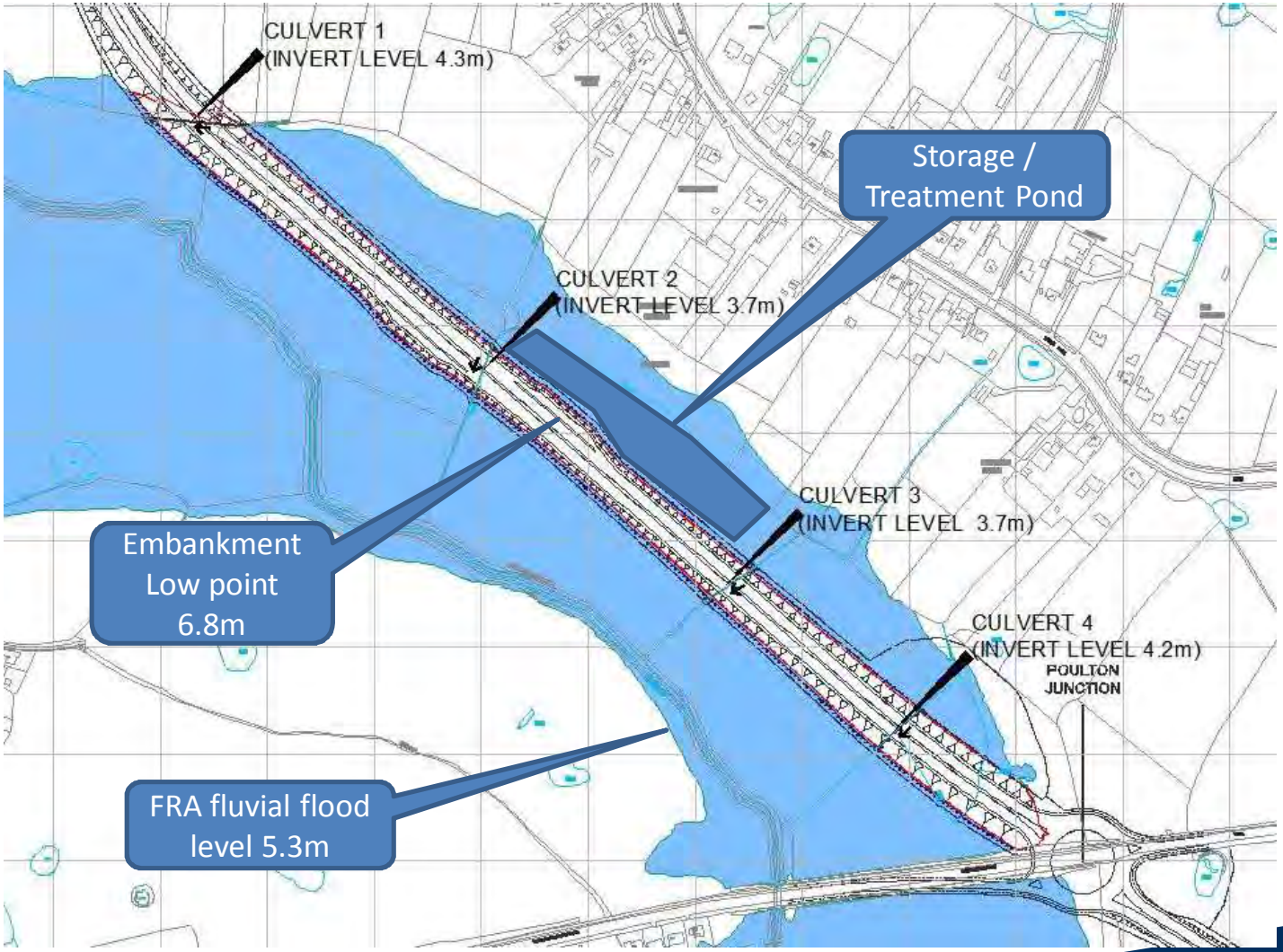


highways england

Skippool Tidal Flood Area

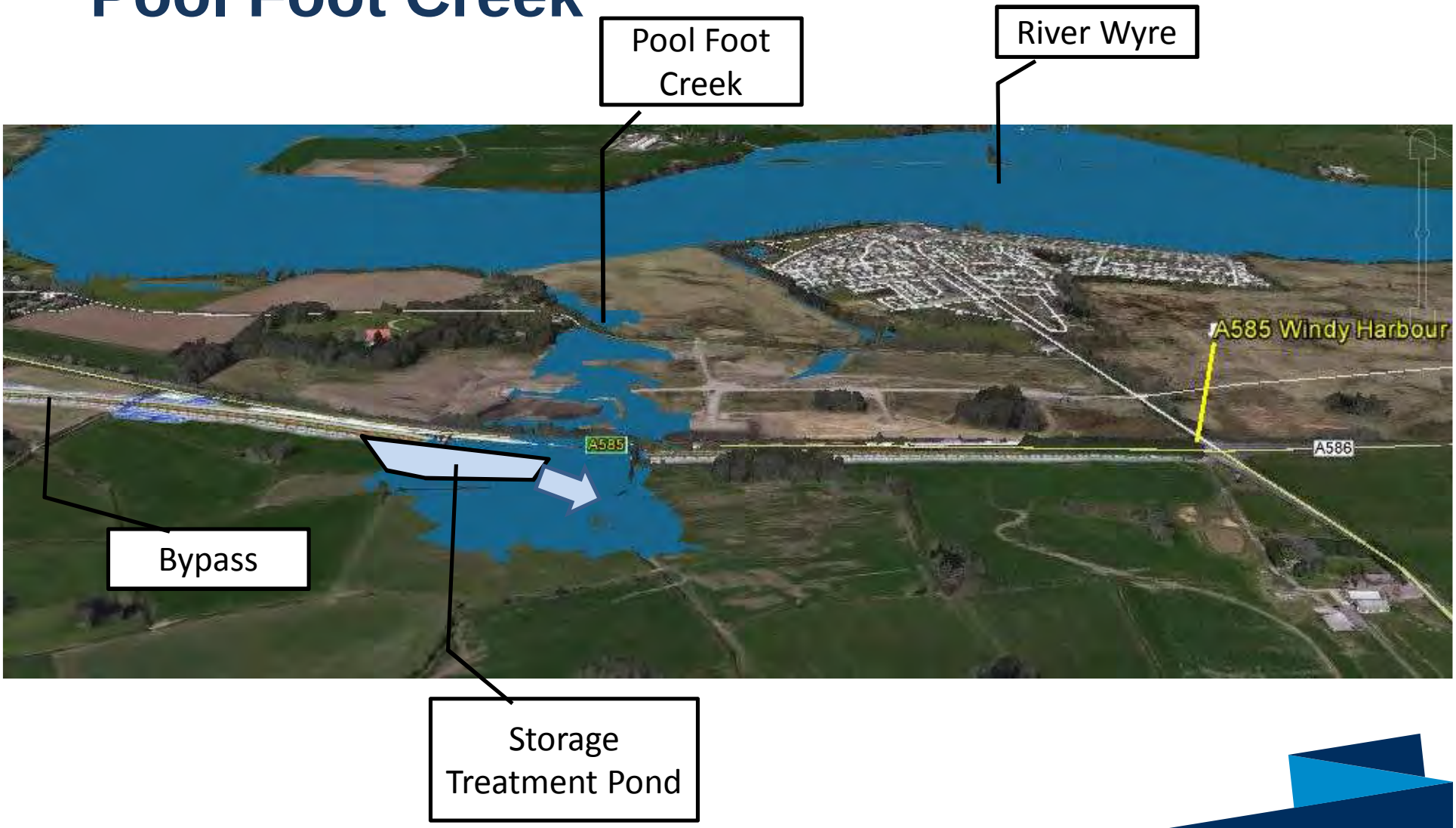
highways england

Main Dyke Flood Plain



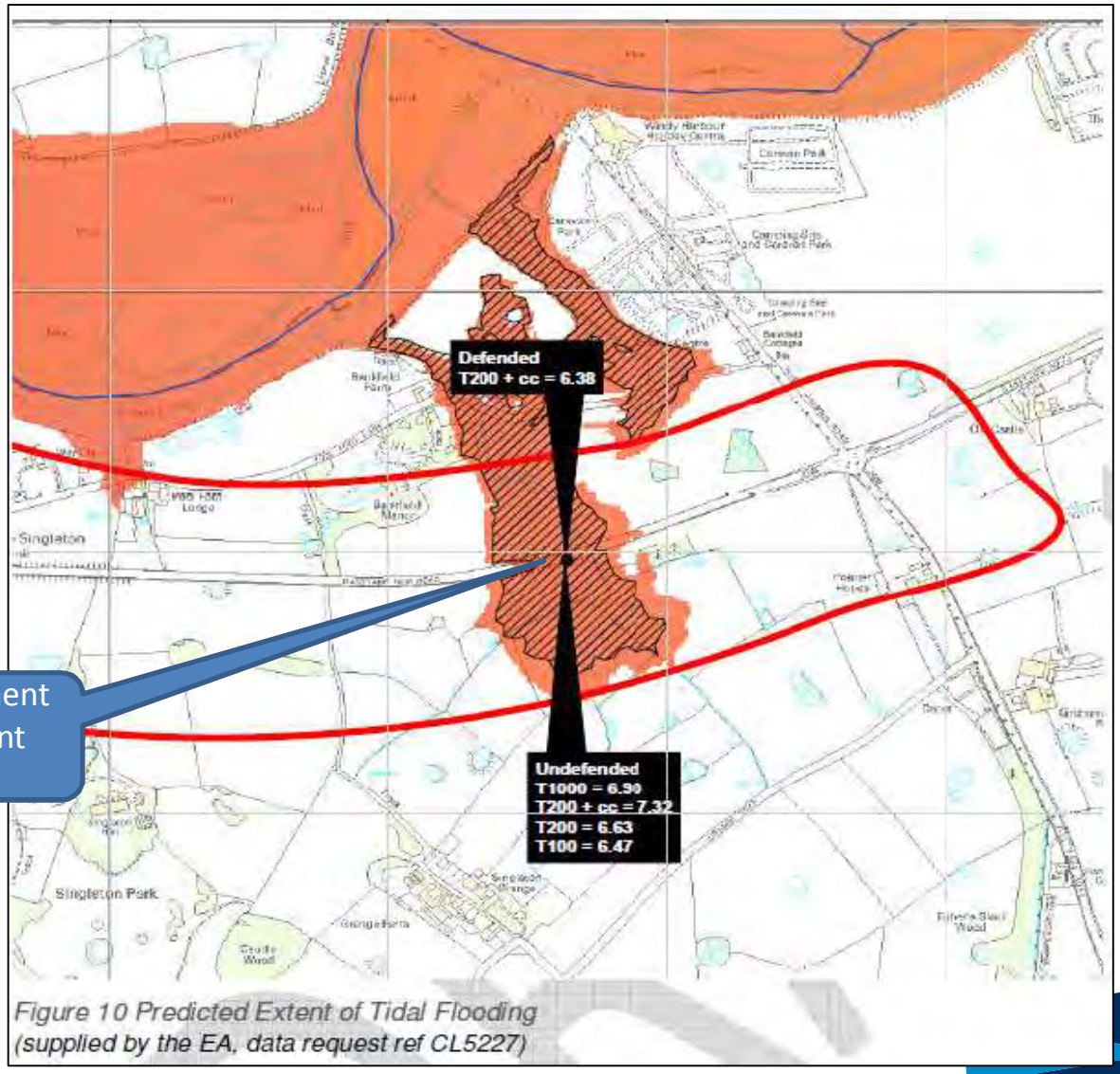
highways england

Pool Foot Creek



highways england

Pool Foot Creek



Embankment Low point 6.8m

Figure 10 Predicted Extent of Tidal Flooding (supplied by the EA, data request ref CL5227)

highways england

Existing Drainage - Data

- Limited drainage information available;
- HADMMS data used for Skippool Junction;
- As-built data used for Windy Harbour Junction;
- Limited CCTV data available for Windy Harbour and Skippool Junctions only; and
- Gap analysis plans and specification have been produced to allow CCTV asset and condition surveys to be undertaken.

Existing Drainage – System / Catchments

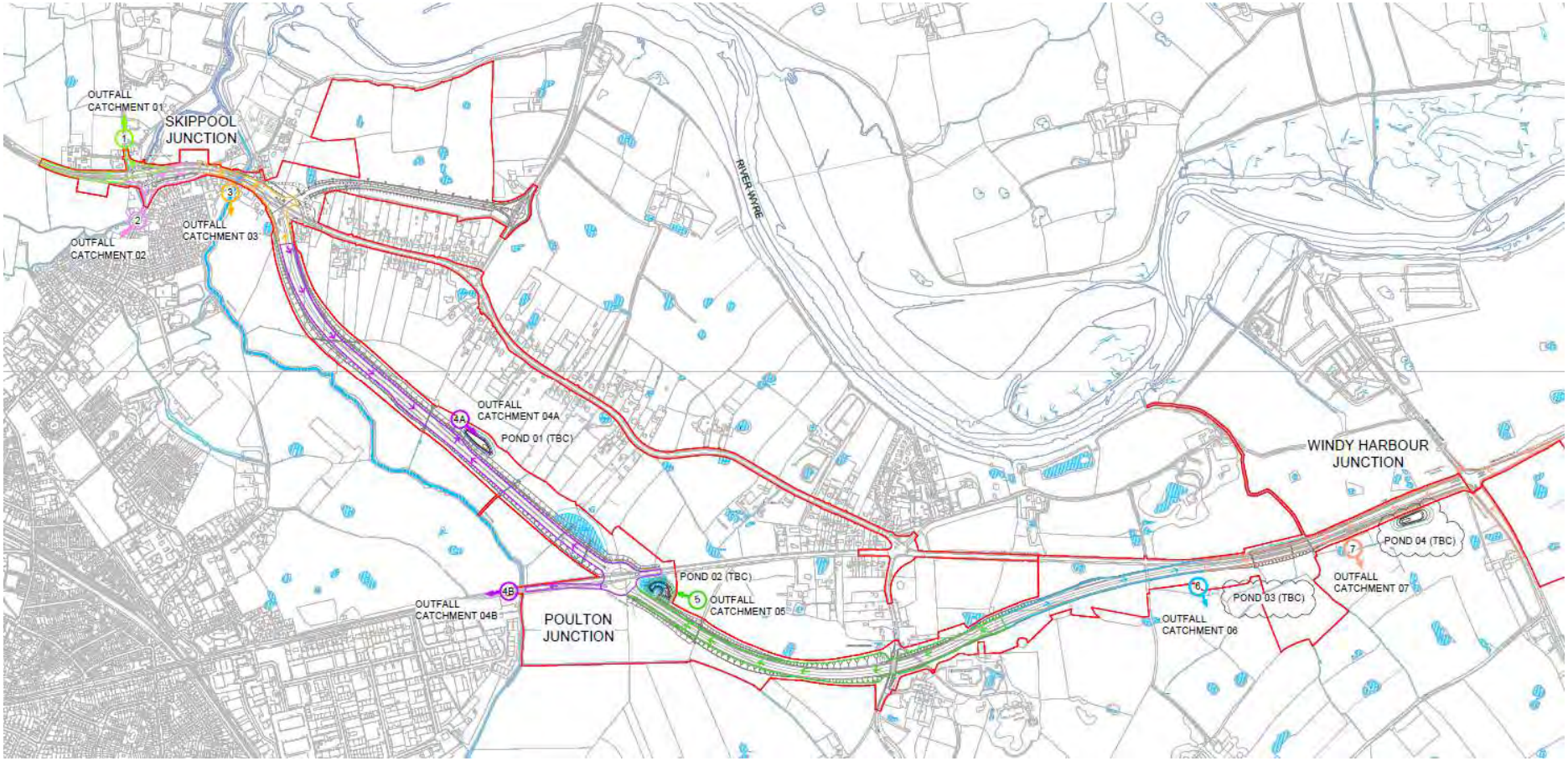
- There are currently 13no. existing drainage catchments;
- Existing highway drainage predominantly consists of gullies discharging to carrier drainage systems which outfall direct to ditches or watercourses; and
- There are currently no attenuation or pollution control measures; except for the recently updated Windy Harbour junction where CDK and oversized pipes with a penstock have been provided for spillage containment.

highways england

Proposed Drainage – Strategy

- Maintain existing drainage outfalls at tie-in locations and discharge rates;
- Separate filter drain system in Lodge Lane cutting to deal with groundwater;
- Pre-earthworks ditches and filter drains;
- No bridge deck drainage required at Skippool Bridge and Lodge Lane;
- 20% climate change allowance incorporated into the design < 2085 (table 5 of NPPF);
- Designed for maintenance;
- 5no. new 1.5m diameter culverts; and
- 2no. Existing 0.9m diameter culverts to be extended.
- HAWRAT assessment to dictate vortex separators

Proposed Drainage - Catchments



- 7No. Catchments on the mainline; and
- 9No. Catchments if Shard Link road is included.

highways england

Proposed Drainage - Catchments

Catchment 1 and 2 :

- Maintain existing outfall to Horsebridge Dyke culvert and flow rate – oversized pipes with orifice flow control / penstock and vortex oil and grit separator.

highways england

Proposed Drainage - Catchments

Catchment 3 and 5b:

- Replacement connection to Main Dyke – oversized pipes with orifice flow control / penstock and vortex oil and grit separator.

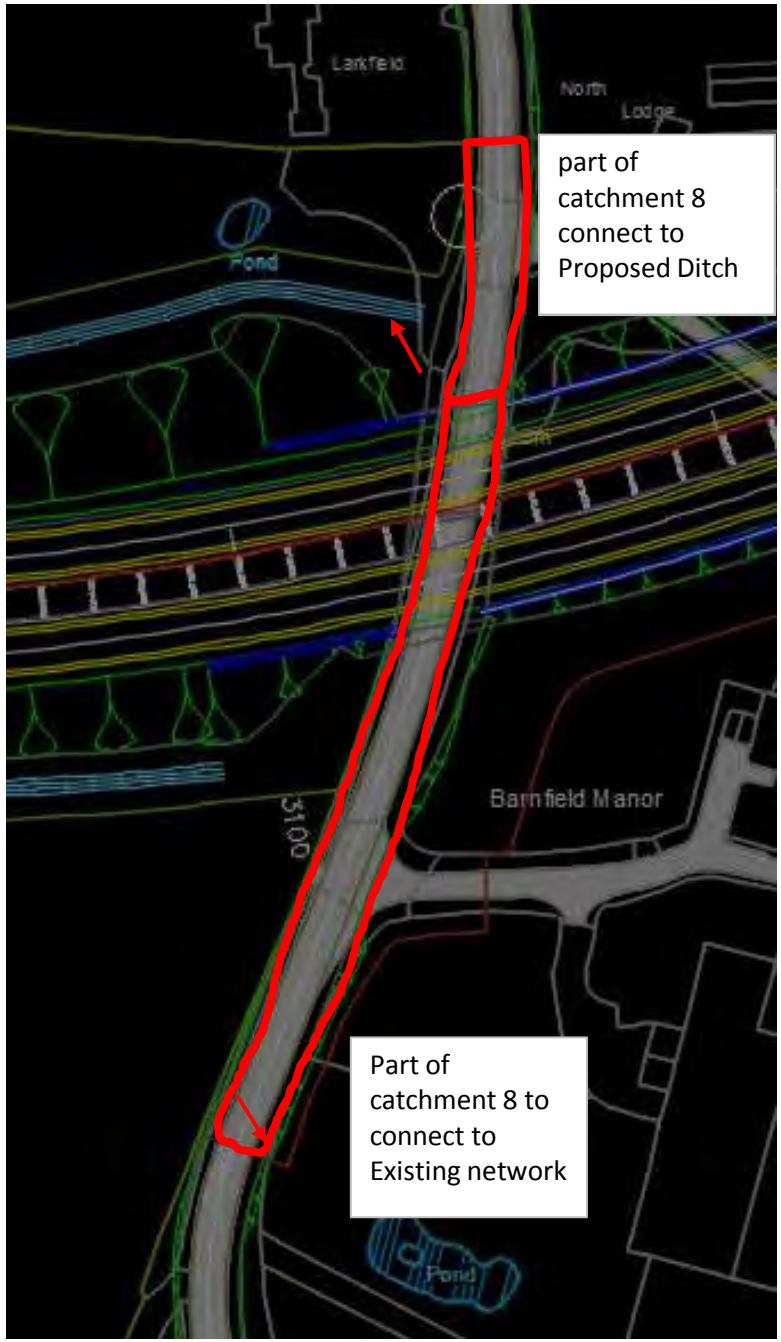
highways england

Proposed Drainage - Catchments

Catchment 4 to 7 :

- Proposed storm water drainage to discharge to existing / proposed ditches which discharge to Main Dyke – wetlands with vortex oil and grit separators.

highways england



Proposed Drainage - Catchments

Catchment 8:

- Connection to proposed ditch and existing Network (subject to verification following CCTV asset and condition survey)

highways england

Proposed Drainage - Catchments

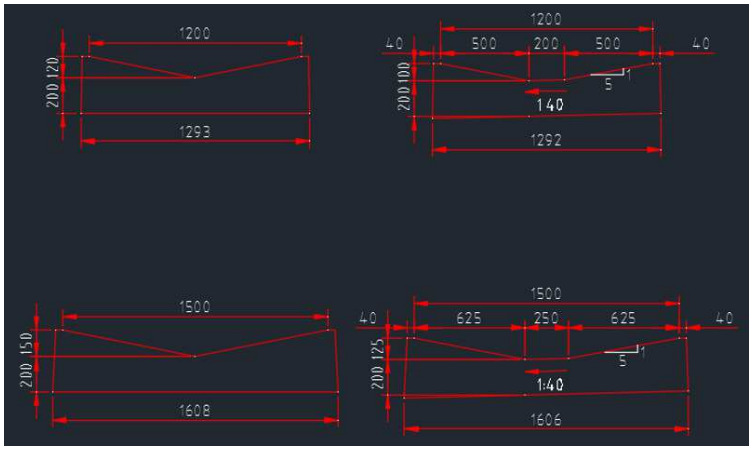
Catchment 9:

- Part of the proposed catchment will discharge to a proposed Wetland and the other part to an exiting network (subject to CCTV asset and condition survey)

highways england

Proposed Drainage – Systems to be used

- Verge drainage to be SWC / filter drains;
- Central reserve drainage to be SWC with a separate filter drain within the large width areas;
- Junctions to be either gullies or combined kerb and drainage units; and
- SWC to be triangular (1.2m in the verge and 1.5m for central reserves).



SWC typical sections

highways england

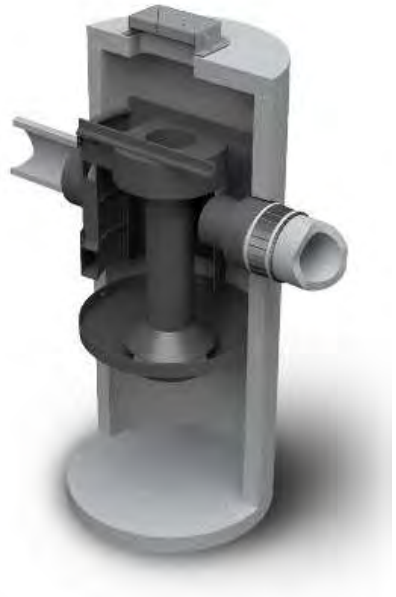
Proposed Drainage – Attenuation / Water Quality

- Oversized pipes designed to accommodate the 1 in 5 years storm return period and discharge restricted to existing discharge rates (1 in 5 year flow rates).
- Wetlands designed to accommodate 1 in 100 year storm event with a 20% allowance for climate change, discharge restricted to greenfield run-off rates.
- Wetlands located in flood zones protected against the 1 in 100 year fluvial flood level (300mm free board); and
- Wetland maintenance access provided off network (where possible).

highways england

Proposed Drainage – Flow control / Spillage containment

- Flow control – orifice plates;
- Pollution control values – penstocks; and
- Sediment and oil removal – vortex separators.



highways england

Proposed Drainage - Departures

- Surcharging of the drainage networks during 1 in 1 year storm events.
- Increased spacing for man access chambers from a maximum of 100m to 150m; and
- Increase the diameter of a Type 7 catch-pit from 1050m diameter to accommodate larger pipes;

A585 Skippool to Windy Harbour Improvement Scheme – Drainage O.D Scheme Introduction Presentation

16th November 2017/ 10:30am

Falcon House, Ground Floor (Unit 1), Fulwood Park, Caxton Road, Fulwood, Preston, PR2 9NZ - Room: Peregrine

Attendees:

[redacted] – Arcadis Consulting – Drainage Lead
[redacted] – Arcadis Consulting – Drainage Senior Engineer
[redacted] – Highways England – O.D Department
[redacted] – Highways England – O.D Department

Apologies:

[redacted] – Arcadis Consulting – Project Manager
[redacted] – Highways England – O.D Department
[redacted] – Highway England – Scheme Project Manager

Item no.	Notes/actions	Action owner
1	**Introduction**	-
1.1	AC stated that the purpose of the meeting was to introduce the A585 Skippool to Windy Harbour Improvement Scheme and discuss the existing water environment, existing highway drainage and our proposed drainage strategy.	-
1.2	AC stated that do this he had produced a presentation (document number: HE548643-ARC-GEN-A585-PR-ZM-3000). The presentation will cover the following agenda: 1. Location overview; 2. Existing road network and the main constraints; 3. Existing A585 issues; 4. Scheme objectives; 5. Summary of options; 6. Proposed route; 7. Existing overland flow catchments; 8. Existing drainage; 9. Proposed drainage strategy; 10. Proposed drainage and catchments; and 11. Proposed Departures.	-
2	**Agenda items 1 to 6**	
2.1	AC gave a brief introduction to the scheme explaining that the Preferred Route Announcement (PRA) had been issued on 24th October 2017 and the preliminary design (Stage 3) for the scheme was being developed to set the red line boundary ready for the Development Control Order (DCO).	-
2.2	AC stated that Option 1b (Southern offline bypass) was being taken forward as per the PRA.	
3	**Agenda item 7 - Existing overland flow catchments**	
3.1	AC stated that there are 4no. Main Rivers within the scheme extents, these being the River Wyre, Horsebridge Dyke, Main Dyke and Pool Foot Creek.	-
3.2	AC stated that a Flood Risk Assessment was being produced and discussions had been held with the Environment Agency with regards the effect of the proposed embankment on the fluvial and tidal flood zones.	-
3.4	AC explained that 5no. new 1.5m diameter culverts would be required along the offline bypass and the extension of 2no. existing 900mm diameter culverts to accommodate the dualling of the existing carriageway at Windy Harbour Junction.	-
3.5	BS asked if the culvert size was based on the hydraulic capacity required	-
3.6	AC stated that the DMRB (HA107) states that all culverts under the carriageway greater than 12m long need to be a minimum of 1.2m in diameter. However, as the culverts need to accommodate	-

	mammal shelves the diameter has been increased to 1.5m diameter. The increase in size also helps with future inspections and maintenance.	
3.7	DW asked if the culverts were included in the FRA and what their effect was on the tidal flooding.	-
3.8	AC stated that the culverts and proposed wetlands were included in both the fluvial and tidal models.	-
3.9	DW enquired about the effect this had on the fluvial and tidal flood water levels.	-
3.10	AC stated that as part of the scheme the existing Skippool Bridge was going to be replaced and 2no. structures constructed. The new structures would be larger clear span structures (bridge / box culverts) which actually reduced the flood water levels, even though the new embankment took up floodplain storage. AC stated that this will all form part of the FRA.	-
3.11	Agenda item 8 – Existing drainage	-
3.12	AC explained that there was limited existing drainage data available and gap analysis plans had been created along with an CCTV asset and condition survey specification to allow asset data to be gathered to confirm our current design.	-
3.13	AC explained that the existing drainage networks along the existing A585 utilised kerb and gullies, which discharge via carrier drains to the ditches and ultimately the watercourses.	-
3.14	BS asked what would happen to the existing A585 when are scheme is complete.	
3.15	AC stated that the existing A585 would be de-trunked and given to Lancashire County Council (LCC).	-
3.16	DW asked if the existing drainage on the de-trucked section was in good condition.	-
3.17	AC stated that we have limited information and the gap analysis included the de-trunked section. AC stated that the team was aware that LCC may ask for defects to be repaired prior to them accepting ownership.	-
3.18	BS stated that Area 13 had undertaken some drainage works / CCTV surveys along the existing A585 and he will forward this data.	-
3.19	BS stated that a lot of the existing properties along the existing A585 discharged their foul / surface water drainage to septic tanks. United Utilities (UU) have just undertaken a scheme to separate the foul and storm water and have built a new sewer line and pumping station.	--
3.20	AC stated that we had statutory undertakers plant information on our drawings, but if BS had plans he could share with us that showed the constructed route that would be great. **Post Minute Note:** BS has attempted to make contact with UU but all telephone numbers are not in use. He will try to email PM to see if she is still with UU.	BS
3.21	AC stated that apart from the Windy Harbour Junction improvement works where an oversized pipe and penstock value had been installed, the remainder of the existing drainage catchments current have no form of attenuation, water quality treatment or accidental spillage control.	-
4	**Agenda items 9 & 10 – Proposed drainage strategy and catchments**	
4.1	AC stated that all existing drainage catchments had been hydraulically modelled based on eth 1 in 1, 5 and 100 year return periods, and where we planned to re-use existing outfalls the existing 1 in 5 year discharge rate would be maintained.	-
4.2	DW asked if climate change would be included in the proposed design.	-
4.3	AC stated that the existing hydraulic modelling did not include an allowance for climate change, but confirmed that a 20% climate change allowance would be included to proposed drainage networks as per HD33. A 40% sensitivity check would also be undertaken.	-
4.4	AC stated that pre-earthworks ditches and filter drains would be used to drainage third party run-off and these would be kept separate from the surface water drainage systems.	-
4.5	AC stated that a separate filter drain system would be incorporated in the mainline verges and central reserve at lodge lane cutting to accommodate the potential high groundwater flows. AC stated that we have no Ground Investigate (GI) data at the moment, but the geology in the area suggest that groundwater flows could be high, so the design has progressed on a worst-case basis.	-
4.6	BS asked when the survey would be undertaken and if the design would be reviewed	-
4.7	AC stated that as the scheme was only at stage 3, once the survey had been undertaken in Feb/March 2018, the design could be updated accordingly.	AC
4.8	AC stated that at the junctions / tie in locations kerb and gullies or combined kerb and drainage units (CDKU) had been used. On the mainline bypass concrete triangular Surface Water Channel SWC) had been adopted (1.28m wide in the verge and 1.58m wide in the central reserve).	-

4.9	BS understood that the standards propose the use of SWC, but in this personnel opinion, they do require a lot of maintenance.	-
4.10	AC stated that the drainage design was based on providing the most efficient / safe solution which required the minimum amount of maintenance.	-
4.11	AC stated that trapezoidal channels have a greater hydraulic capacity, but are harder to maintain as they required greater passes with the road sweeper to clean, which had health and safety implications for the operatives. So, the scheme has adopted triangular channels.	-
4.12	AC stated that the scheme had 7no. catchments which would increase to 9no. catchments if Shard Link Road was included in the scheme.	-
4.13	AC stated that catchments 1,2 and 3 utilised existing outfalls and would be drained via kerb and gullies or combined kerb and drainage units (CDKU). These would discharge through carrier drains and oversized pipe would be used for attenuation with a penstock and orifice plate for spillage containment and flow control. A vortex grit separator has been installed upstream of the attenuation pipe to remove sediment. However, the need for the separators would be reviewed once the HAWRAT assessment had been undertaken. If the assessments show they are not required, then they will be removed. The new bridges have a 1m hard strip and due to the cross fall and longitudinal fall no bridge deck drainage is required. Gullies will be provided upstream and downstream of the bridge.	-
4.14	BS requested a copy of the HAWRAT assessment, so his team could review, as there may be some localised issues that may need to be addressed.	AC
4.15	AC stated that catchment 4 to 7 used SWC which discharges to a carrier system, prior to discharge to a wetland which will provide water quality treatment and accidental spillage containment. The wetland forebay has been replaced with a vortex grit separate to capture sediment and floatables as they have a smaller footprint and are easier to clean.	-
4.16	BS stated that he had seen them on the network, but wasn't sure if the workforce had been trained to use them.	-
4.17	AC stated that on another scheme he designed, training had been incorporated in the 500 series specification and he can do this in the draft preliminary design specification.	-
4.18	BS stated that we need to review the offline bypass against the UU drawings he can provide to make sure that we do not damage the existing A585 drainage outfalls that discharge into Main Dyke.	-
4.19	BS to provide drawings following receipt of the minutes of the meeting. **Post Minute Note:** BS has attempted to make contact with UU but all telephone numbers are not in use. He will try to email PM to see if she is still with UU.	BS
4.20	AC to review UU drawing and update the design as required.	-
4.21	AC stated that catchment 8 covered existing Lodge lane which will now be on a bridge over the mainline. No drainage is required on the bridge. The small catchment upstream of the bridge will be connected into the pre-earthworks ditch. The catchment downstream of the bridge will connect into the existing drainage system following verification by CCTV asset and condition survey. Lodge lane is a local authority road and discussion are to be held with LCC.	-
4.22	AC stated that catchment 9 covers Shard Link Road which is drained by a SWC discharging to a wetland. There is still debate if this link road will be included in the scheme. **Post Minute Note:** Shard Link Road has been removed from the scheme following a written instruction from Highways England (17/11/2017)	-
4.23	AC confirmed that: ▪ Oversized pipes are designed to accommodate the 1 in 5 years storm return period with the discharge restricted to existing discharge rates (1 in 5 year flow rates); ▪ Wetlands had been designed to accommodate 1 in 100 year storm event with a 20% allowance for climate change with the discharge restricted to greenfield run-off rates; ▪ Wetlands located in flood zones protected against the 1 in 100 year fluvial flood level (300mm free board); and ▪ Wetland maintenance access provided off network (where possible).	-

5	**Agenda Item 11 – Proposed departures**	
5.1	1.1 AC stated that 3no. drainage departures will be applied for on the scheme, these being: ▪ Surcharging of the drainage networks during 1 in 1 year storm events; ▪ Increased spacing for man access chambers from a maximum of 100m to 150m. ▪ Increase the diameter of a Type 7 catch-pit from 1050m diameter to accommodate larger pipes; and ▪ Use of draft standard for vortex grit separators.	-
5.2	AC stated that concluded the presentation and asked DW if he had any concerns.	-
5.3	DW confirmed that in principal he had no issue with the proposed drainage works as described in the presentation.	-
5.4	AC asked if DW could provide contact details for Lancashire County Council as he had tried to get hold of them via their website but had received a reply.	-
5.5	DW stated that the Lancashire County Council Network Manager was Daniel Herbert and his contact detail are: • Mobile: 07967 137 401; • Telephone: 01772 538 654; • Email: Daniel.herbert@lancashire.gov.uk	-
5.6	DW stated that we could also contact Paul Binks, but he didn't have any contact details for him	-

[redacted]

From: [redacted]
Sent: 23 November 2017 13:26
To: NWNorthPlanning
Subject: RE: F.A.O [redacted] - A585 Windy Harbour to Skippool Improvement Scheme

Hi Alex,

Thank you for your email.

See me response below in Orange.

In summary

- Our design is in accordance with the DMRB and current best practice (C753);
- Catchment 4 wetland is located within flood zone 3 and will form part of the Flood Risk Assessment works being undertaken by Lisa Driscoll / Claire Gibson, which will be issued in due course; and
- Permits will be issued at detailed design stage (currently at preliminary design) for new outfalls to the Main Rivers.

Regards

Alan

From: NWNorthPlanning [mailto:CLPlanning@environment-agency.gov.uk]
Sent: 07 November 2017 11:12
To: [redacted]
Subject: RE: F.A.O [redacted] - A585 Windy Harbour to Skippool Improvement Scheme

Good morning Alan,

Further to my previous emails, we do not have the expertise to provide detailed advice on sustainable drainage systems (SUDS) noted, and commenting on a detailed surface water drainage scheme is not within our remit anymore noted. However, in addition to surface water management SUDS should incorporate pollution control elements to prevent a detrimental impact on local water quality and the Wyre Estuary. We also recommend that green infrastructure opportunities in managing water resources, reducing flood risk, encouraging biodiversity and adapting to climate change, are maximised along the proposed route to provide multiple benefits to the local environment, economy and society.

We recommend you refer to latest Volume 4 of the Design Manual for Roads and Bridges (DMRB) guidance which was updated in August 2017 is available at http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm. This replaces the withdrawn guidance which is available on GOV.UK: https://www.gov.uk/guidance/standards-for-highways-online-resources. The guidance contains detail on the treatment efficiencies of a variety of treatment devices.

We also recommend the CIRIA C753 document SUDS manual also provides guidance provides best practice guidance on the planning, design, construction, operation and maintenance of sustainable drainage systems. This, along with other guidance, is available via the Susdrain website: http://www.susdrain.org/resources/ciria-guidance.html

I can confirm that our design is in accordance with the DMRB and our SUDS systems are designed to HA and incorporate best practice from CIRIA C753.

The plan you forwarded to us shows indicative locations for surface water attenuation ponds. It should be taken into consideration that if these ponds are located in Flood Zone 3 they will not operate correctly if they are already flooded from fluvial and/or tidal sources, and are needed to attenuate surface water run-off. We therefore recommend that any attenuation ponds currently within Flood Zone 3 are re-located along the highway to areas in Flood Zone 1. The wetland in Flood Zone 3 is set above the 1 in 100 year fluvial flood level as agreed with Highway England. The wetland is included in the fluvial and todal flooding modelling which will be issued as part of the flood risk assessment for the scheme.

Please note that the Flood Defence Consent regime has moved into the Environmental Permitting Regulations, as of 6 April 2016. An Environmental Permit may be required and in particular, no trees or shrubs may be planted, nor fences, buildings, pipelines (including outfalls) or any other structure erected within 8 metres of any non-tidal Main River watercourses without an Environmental Permit. You should refer to the GOV.UK website for further information: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits. Our Flood and Coastal Risk Management team may be able to provide advice in relation to any forthcoming permit application. Noted, we are proposing new outfalls into Main Dyke and I will submit the relevant permit. Any works to Ordinary Watercourses may require the consent of the Lead Local Flood Authority. Noted, and I have arranged a meeting with the LLFA to discuss this works.

Our Billing team have informed me that if our planning advice is required via our charged-for service for any other issues within our remit, we are able to re-open the agreement initially set up with Lisa Driscoll, i.e. agreement number ENVPAC/CMBLNC/00088. Unfortunately, due to resourcing issues we are unable to attend any meetings or provide written comments on detailed plans and documents via our charged planning advice service at this current time. Noted.

I trust the above is of assistance to you. Thanks

Best regards,

Alex

[redacted]
Planning Advisor, Sustainable Places
Environment Agency - Cumbria & Lancashire Area

Lutra House, Dodd Way, Off Seedlee Road, Walton Summit, Bamber Bridge, Preston PR5 8BX
020 302 51215
CLPlanning@environment-agency.gov.uk

Working in partnership to enable sustainable growth and create better places for people and wildlife

---

From: [redacted]
Sent: 01 November 2017 16:24
To: NWNorthPlanning <CLPlanning@environment-agency.gov.uk>
Subject: RE: F.A.O [redacted] A585 Windy Harbour to Skippool Improvement Scheme

Hi Alex,

Thanks for the email and LLFA information.

I look forward to hearing from you.

Regards

Alan

From: NWNorthPlanning [mailto:CLPlanning@environment-agency.gov.uk]
Sent: 01 November 2017 16:23
To: [redacted]
Subject: RE: F.A.[redacted] - A585 Windy Harbour to Skippool Improvement Scheme

Hello Alan,

I will check with our functional teams regarding your points.

The Lead Local Flood Authority is Lancashire County Council, their email address is suds@lancashire.gov.uk. Further information is on their website: http://www.lancashire.gov.uk/council/planning/sustainable-drainage-systems.aspx.

In relation to point 4, ordinary watercourses are under the remit of the LLFA: http://www.lancashire.gov.uk/flooding/drains-and-sewers/alterations-to-a-watercourse.aspx.

Best regards,

Alex

[redacted]
Planning Advisor, Sustainable Places
Environment Agency - Cumbria & Lancashire Area

Lutra House, Dodd Way, Off Seedlee Road, Walton Summit, Bamber Bridge, Preston PR5 8BX
[redacted]
CLPlanning@environment-agency.gov.uk

Working in partnership to enable sustainable growth and create better places for people and wildlife

Follow us on Twitter @EnvAgencyNW
Visit the website - https://www.gov.uk/environment-agency
Visit our blog - https://environmentagency.blog.gov.uk/

From: [redacted]
Sent: 31 October 2017 20:19
To: NWNorthPlanning <CLPlanning@environment-agency.gov.uk>
Subject: RE: F.A.[redacted] A585 Windy Harbour to Skippool Improvement Scheme

Hi Alex,

Thank you for coming back to me.

As part of the drainage design for the scheme we plan to introduce:

1. New drainage outfalls to the watercourses (re-use of existing outfalls to main river and others to ordinary watercourses);
2. New SuDs systems upstream of the outfalls to deal with water quality and attenuation;
3. Pollution control measures; and
4. New culverts to ordinary watercourses.

Do you have contact details for the Local Lead Flood Authority?

Regards

Alan

From: NWNorthPlanning [mailto:CLPlanning@environment-agency.gov.uk]
Sent: 31 October 2017 16:59
To: [redacted]
Subject: RE: F.A.O Alex Hazel - A585 Windy Harbour to Skippool Improvement Scheme

Hello Alan,

Thank you for your email.

Our attendance at a meeting would fall under our voluntary charged planning advice service which allows us to recover our costs. Please can you expand on what you are seeking our advice on in relation to the drainage scheme, as we no longer have the remit for surface water issues in relation to developments exceeding 1 hectare. This is now under the remit of the Lead Local Flood Authority.

Please note that we may have an existing charging agreement in place under reference ENVPAC/CMBLNC/00088, but I will have to check with our Billing team if it is still open. We provided our free preliminary opinion response (attached) to Lisa Driscoll, and in April 2017 we responded to a request from Lisa to review a Flood Risk Assessment.

Any request for further planning advice should be submitted to clplanning@environment-agency.gov.uk. Your request should specify the additional services that you require from us. We will review your request and provide you with a written offer based on our planning advice charges of £84 per person per hour. We will not undertake any additional work until an offer has been accepted.

Please be aware that our charged advice service is voluntary and that we may be unable to provide charged advice where other operational activities and issues prevent us from doing so.

Best regards,

Alex

[redacted]
Planning Advisor, Sustainable Places
Environment Agency - Cumbria & Lancashire Area

Lutra House, Dodd Way, Off Seedlee Road, Walton Summit, Bamber Bridge, Preston PR5 8BX
[redacted]
CLPlanning@environment-agency.gov.uk

Working in partnership to enable sustainable growth and create better places for people and wildlife

Follow us on Twitter @EnvAgencyNW
Visit the website - https://www.gov.uk/environment-agency
Visit our blog - https://environmentagency.blog.gov.uk/

DO YOU KNOW WHAT TO DO? FLOODS DESTROY BE PREPARED

[redacted]
Sent: 31 October 2017 14:47
To: NWNorthPlanning <CLPlanning@environment-agency.gov.uk>
Cc: A585WindyHarbourToSkippool@highwaysengland.co[redacted]
[redacted] to Skippool Improvement Scheme

Hi Alex,

Good to speak to you earlier today.

As discussed, my colleague [redacted] has been in discussions with [redacted] with regards the Flood Risk Assessment for the scheme and has given me your contact details. I'm responsible for the surface water drainage strategy for the scheme, and I would like to give you a presentation to allow you to provide any comments that you might have.

I attach a draft plan which shows the scheme extents and drainage catchments.

Can you please confirm a date, time and location when you are available.

Regards

[redacted]
Arcadis | Aston Cross Business Village, 50 Rocky Lane, Aston, Birmingham, B6 5RQ, UK
T. +44 (0)121 345 9078

www.arcadis.com

ARCADIS Design & Consultancy for natural and built assets

This message has been scanned and no issues were discovered.
Click here to report this email as spam

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else.

We have checked this email and its attachments for viruses. But you should still check any attachment before opening it.
We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.
Click here to report this email as spam

This email and any files transmitted with it are the property of Arcadis and its affiliates. All rights, including without limitation copyright, are reserved. This email contains information that may be confidential and may also be privileged. It is for the exclusive use of the intended recipient(s). If you are not an intended recipient, please note that any form of distribution, copying or use of this communication or the information in it is strictly prohibited and may be unlawful. If you have received this communication in error, please return it to the sender and then delete the email and destroy any copies of it. While reasonable precautions have been taken to ensure that no software or viruses are present in our emails, we cannot guarantee that this email or any attachment is virus free or has not been intercepted or changed. Any opinions or other information in this email that do not relate to the official business of Arcadis are neither given nor endorsed by it.

This message has been scanned and no issues were discovered.
Click here to report this email as spam

A585 Skippool to Windy Harbour Improvement Scheme – Lancashire County Council – Drainage Scheme Introduction Presentation

20th March 2018/ 13:00

Lancashire County Council Highways offices, Cuerden Way, Bamber Bridge, Preston PR5 6BS.

Attendees:

[redacted] – Arcadis Consulting – Drainage Lead
[redacted] – Arcadis Consulting – Drainage Senior Engineer
[redacted] – Lancashire County Council – Flood Risk Assistant Engineer
[redacted] – Lancashire County Council – Principal Flood Risk Officer
[redacted] – Lancashire County Council – Senior Flood Risk Engineer

Apologies:

None

Item no.	Notes/actions	Action owner
1	**Introduction**	-
1.1	AC stated that the purpose of the meeting was to introduce the A585 Skippool to Windy Harbour Improvement Scheme and discuss the existing water environment, existing highway drainage and our proposed drainage strategy.	-
1.2	AC stated that do this he had produced a presentation (document number: HE548643-ARC-HDG-A585-PP-ZM-3006). The presentation will cover the following agenda: 1. Location overview; 2. Existing road network and the main constraints; 3. Existing A585 issues; 4. Scheme objectives; 5. Summary of options; 6. Proposed route; 7. Existing overland flow catchments; 8. Existing highway drainage; 9. Proposed drainage strategy; 10. Proposed drainage and catchments; and 11. Proposed Departures.	-
2	**Agenda items 1 to 6**	-
2.1	AC gave a brief introduction to the scheme explaining that the Preferred Route Announcement (PRA) had been issued on 24th October 2017 and the preliminary design (Stage 3) for the scheme is being developed to set the red line boundary ready for the Development Control Order (DCO) in June 2018.	-
2.2	AC stated that Option 1b (Southern offline bypass) was being taken forward as per the PRA.	-
3	**Agenda item 7 - Existing overland flow catchments**	-
3.1	AC stated that there are 4no. Main Rivers within the scheme extents, these being the River Wyre, Horsebridge Dyke and Main Dyke **Post Minute Note** Pool Foot Creek is note main river.	-
3.2	AC stated that a Flood Risk Assessment was being produced and discussions had been held with the Environment Agency (EA) with regards the effect of the proposed embankment on the fluvial and tidal flood zones.	-
3.4	AC explained that 5no. new 1.5m diameter culverts would be required along the offline bypass to maintain the existing land ditches. There would also be an extension of 2no. existing 900mm diameter culverts to accommodate the dualling of the existing carriageway at Windy Harbour Junction (subject to a condition survey)..	-
3.5	PB / DT asked if the culvert size was based on the hydraulic capacity required.	-
3.6	AC stated that the DMRB (HA107) states that all culverts under the carriageway greater than 12m long need to be a minimum of 1.2m in diameter. However, as the culverts need to accommodate	-

	mammal shelves the diameter has been increased to 1.5m diameter. The increase in size also helps with future inspections and maintenance.	
3.7	DT asked if the culverts were included in the FRA and what their effect was on the tidal flooding.	-
3.8	AC stated that the culverts and proposed wetlands were included in both the fluvial and tidal models.	-
3.9	DT enquired about the effect this had on the fluvial and tidal flood water levels.	-
3.10	AC stated that as part of the scheme the existing Skippool Bridge was going to be replaced and a replacement two deck bridge structure constructed. The new bridge would be larger clear span structures (bridge / box culverts) which reduced the existing flood water levels, even though the new road embankment took up floodplain storage. AC stated that this will all form part of the FRA analysis.	-
3.11	PB / DT requested a copy of the FRA. AC to provide a copy once it has been issued to EA	AC
3.12	AC stated as the scheme is it the preliminary design stage, he wasn't going to ask for formal Land Drainage Consents (LDC) for the 5no. new culverts and the extension to the 2no. existing culverts. However, he would like to get an agreement in principle to culvert design.	-
3.13	DT stated LDC could take up to 8 weeks for formal approval.	-
3.14	AC requested a copy of the LDC checklist so he can ensure the design complies with their requirements.	DT
3.15	DT / PB stated in principle we agree to your proposals but consent for the permanent works should be applied for, temporary works consent will then be applied for by the appointed contractor at a later date.	-
3.15a	**Post Minute note** AC to discuss with Scheme PM as previous understanding was to include this agreement in principle in the Statement of Common Ground.	AC
4.	**Agenda item 8 – Existing highways drainage**	-
4.1	AC explained that there was limited existing highway drainage data available and gap analysis plans had been created along with an CCTV asset and condition survey specification to allow asset data to be gathered to confirm our current design.	-
4.2	AC explained that the existing drainage networks along the existing A585 utilised kerb and gullies, which discharge via carrier drains to the ditches and ultimately the watercourses.	-
4.3	PB asked what would happen to the existing A585 when are scheme is complete.	
4.4	AC stated that the existing A585 would be de-trunked and given to Lancashire County Council (LCC).	-
4.5	PB asked if the existing drainage on the de-trunked section was in good condition. As their Highway team is unlikely to take it back in poor condition.	-
4.6	AC stated that we have limited information and the gap analysis included the de-trunked section.	-
4.7	AC stated that Area 13 had undertaken some drainage works / CCTV surveys along the existing A585 in 2016, and as the existing drainage could deteriorate further between now and when works starts on site. The existing A585 drainage would not be surveyed until the detailed design stage.	-
4.8	AC stated that the team was aware that LCC may ask for defects to be repaired prior to them accepting ownership.	--
4.9	AC asked if they had any existing drainage information for Lodge Lane?	
4.10	PB stated he would have to ask the highways team as he did not have any carriageway drainage information.	PB
4.11	AC stated that apart from the Windy Harbour Junction improvement works (early scheme) where an oversized pipe and penstock value had been installed, the remainder of the existing drainage catchments currently have no form of attenuation, water quality treatment or accidental spillage control.	-
5	**Agenda items 9 & 10 – Proposed highways drainage strategy and catchments**	-
5.1	AC stated that all existing drainage catchments effected by the works had been hydraulically modelled based on the 1 in 1, 5 and 100 year return periods, and where we planned to re-use existing outfalls the existing 1 in 5 year discharge rate would be maintained.	-
5.2	DT asked if climate change would be included in the proposed design.	-
5.3	AC stated that the existing hydraulic modelling did not include an allowance for climate change but confirmed that a 20% climate change allowance had be included in proposed drainage networks as per HD33. A 40% sensitivity check had also been undertaken.	-

5.4	AC stated that pre-earthworks ditches and filter drains would be used to drain third party run-off and these would be kept separate from the bypass surface water drainage systems.	-
5.5	AC stated that a separate filter drain system would be incorporated in the mainline verges and central reserve at lodge lane cutting to accommodate the potential high groundwater flows. AC stated that we have no Ground Investigate (GI) data at the moment, but the geology in the area suggest that groundwater flows could be high, so the design has progressed on a worst-case basis.	-
5.6	PB asked when the CCTV survey would be undertaken and if the design would be reviewed	-
5.7	AC stated that as the scheme was only at stage 3 (preliminary design), once the survey had been undertaken in April/May 2018, the design could be updated accordingly.	AC
5.8	AC stated that at the junctions / tie in locations kerb and gullies or combined kerb and drainage units (CDKU) had been used. On the mainline bypass concrete triangular Surface Water Channel (SWC) had been adopted (1.28m wide in the verge and 1.58m wide in the central reserve).	-
5.9	PB asked what drainage system(s) has been provided on the Local Authority roads, Lodge lane for example.	-
5.10	AC stated that kerb and gullies had been used on the Local Authority Roads, as he understood that they didn't like combined drainage and kerb units.	-
5.11	PB confirmed that LCC preferred kerb and gullies as combined drainage and kerb units where a maintenance issue.	-
5.12	AC stated that the drainage design was based on providing the most efficient / safe solution which required the minimum amount of maintenance.	-
5.13	AC stated that trapezoidal surface water channels provided along the bypass have a greater hydraulic capacity but are harder to maintain as they required greater passes with the road sweeper to clean, which had health and safety implications for the operatives. So, the scheme has adopted triangular channels.	-
5.14	AC stated that the scheme had 7no. catchments and not 9no. as stated as Shard Link Road had been removed from the scheme.	-
5.15	AC stated that catchments 1,2 and 3 utilised existing outfalls and would be drained via kerb and gullies or combined kerb and drainage units (CKDU's). These would discharge through carrier drains and oversized pipe would be used for attenuation with a penstock and orifice plate for spillage containment and flow control. The new bridges have a 1m hard strip and due to the cross fall and longitudinal fall so no bridge deck drainage is required. Gullies will be provided upstream and downstream of the bridge.	-
5.16	AC stated that vegetative SUD's could not be used in these catchments due to the land constraints adjacent to the carriageway.	-
5.17	AC stated that catchment 4 to 7 used SWC which discharges to a carrier system, prior to discharge to a wetland which will provide water quality treatment and accidental spillage containment. The wetland forebay has been replaced with a vortex grit separate to capture sediment and floatables as they have a smaller footprint and are easier to maintain.	-
5.18	AC stated that catchment 8 covered existing Lodge lane which will now be on a bridge over the bypass. No drainage is required on the bridge. The small catchment upstream (north) of the bridge will be connected into the pre-earthworks ditch. The catchment downstream (south) of the bridge will connect into the existing drainage system following verification by CCTV asset and condition survey. Lodge lane is a local authority road and will be handed back to LCC following the works.	-
5.19	PB / DT asked if the proposed ditch to the north west of Lodge Lane bridge could be widened up to provide some additional treatment. AC to review.	AC / LA
5.20	AC stated that catchment 9 covered Shard Link Road, but Shard Link Road has been removed from the scheme following a written instruction from Highways England.	-
5.21	AC confirmed that: ▪ Oversized pipes are designed to accommodate the 1 in 5 years storm return period with the discharge restricted to existing discharge rates (1 in 5 year flow rates); ▪ Wetlands had been designed to accommodate 1 in 100 year storm event with a 40% allowance for climate change with the discharge restricted to greenfield run-off rates; ▪ Wetland 1 (catchment 4) located in flood zone 3 protected against the 1 in 100 year fluvial flood level (300mm free board); and ▪ Wetland maintenance access provided off network (where possible).	-
5.22	DT asked why the wetland was in flood zone 3 and if it had been included in the FRA.	-

5.23	AC confirmed that the ultimate low point of the road meant that the wetland had to be located with flood zone 3. AC confirmed that the wetland had been included in the FRA.	-
6	**Agenda Item 11 – Proposed departures**	-
6.1	1.1 AC stated that 3no. drainage departures will be applied for on the scheme, these being: ▪ Surcharging of the drainage networks during 1 in 1 year storm events; ▪ Increased spacing for man access chambers from a maximum of 100m to 150m; and ▪ Increase the diameter of a Type 7 catch-pit from 1050m diameter to accommodate larger pipes.	-
6.2	AC stated that concluded the presentation and asked if AG, DT and PB had any concerns with the proposed design.	-
6.3	DT and PB confirmed that in principal they had no issues with the proposed drainage works as described in the presentation.	-
6.4	AC to issue a copy of the Drainage Design Development Report once the preliminary design has been finalised.	AC

A585 WINDY HARBOUR TO SKIPPOOL

STAGE 3 PRELIMINARY DRAINAGE DESIGN

LANCASHIRE COUNTY COUNCIL
DRAINAGE - INTRODUCTION TO THE SCHEME

HE548643-ARC-HDG-A585-PP-ZM-3006_Lancashire County Council - Drainage Introduction

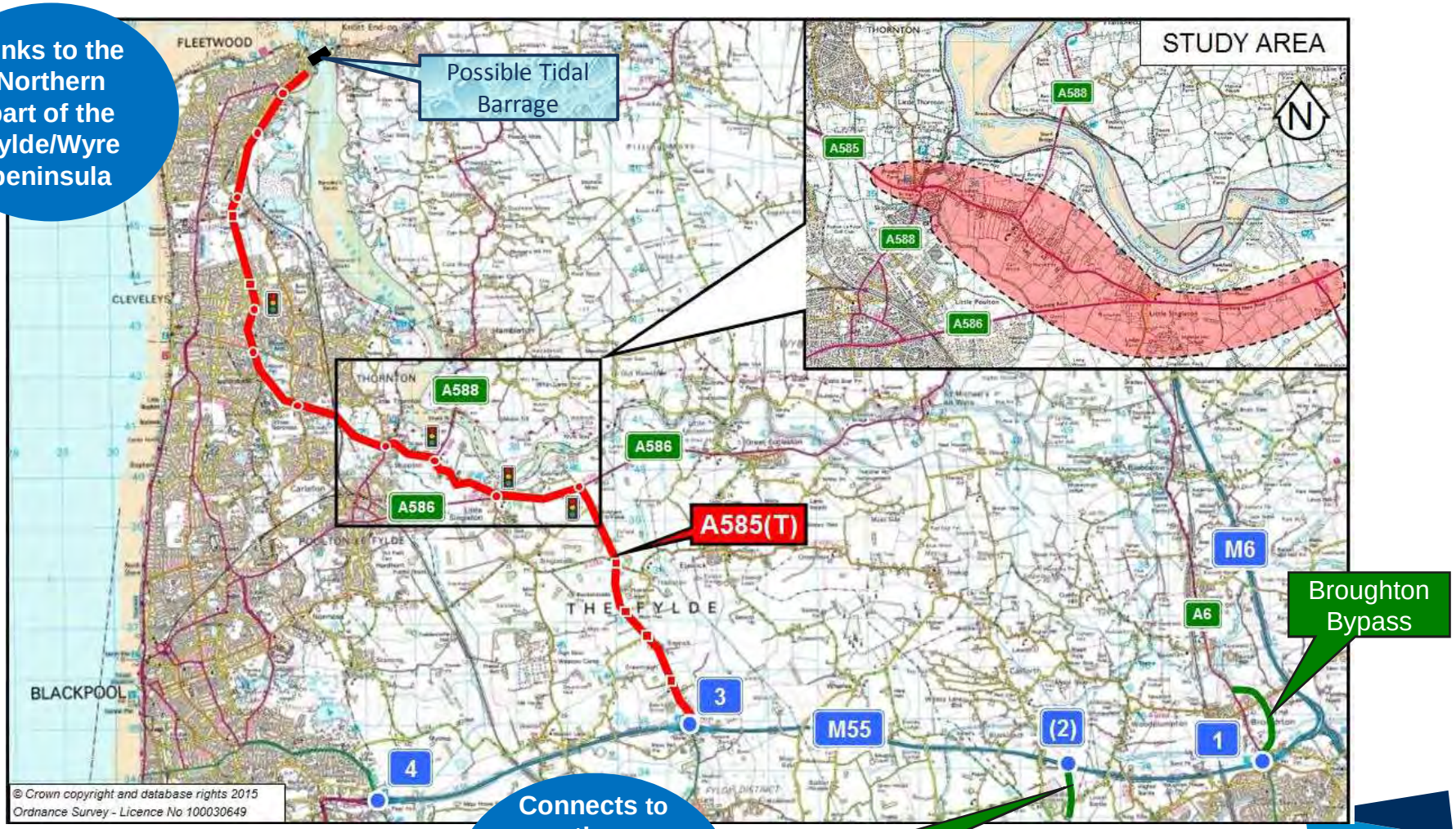
20th MARCH 2018

Presented by: Alan Cope

Agenda

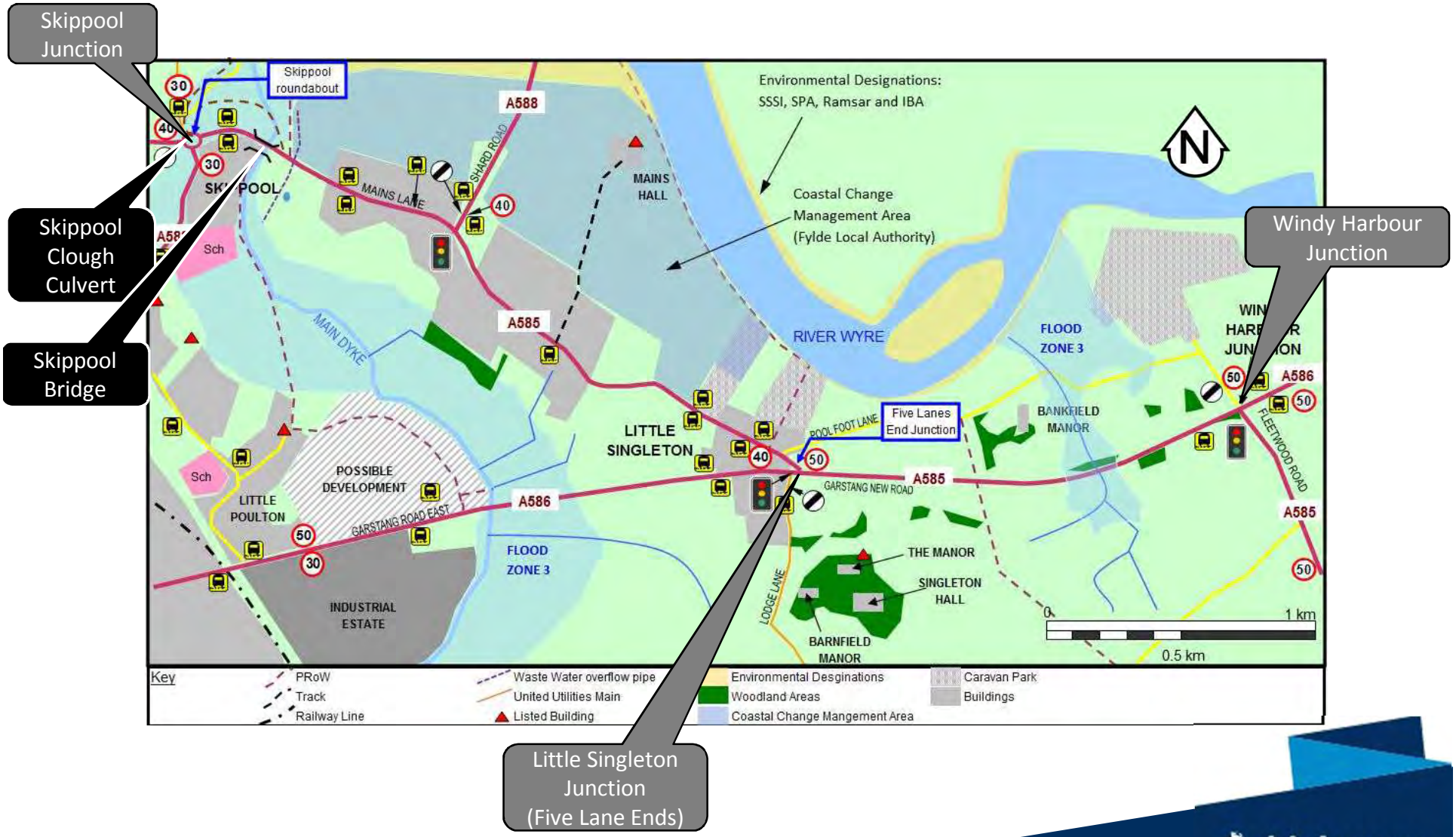
- Location Overview;
- Existing Road Network & Main Constraints;
- Existing A585 Issues;
- Background - existing route;
- Scheme objectives;
- Summary of Options;
- Proposed route;
- Existing overland flow catchments;
- Existing drainage;
- Proposed drainage strategy;
- Proposed drainage and catchments; and
- Proposed departures.

Location Overview



highways england

Existing Road Network & Main Constraints



highways england

Existing A585 Issues

- The Scheme Objective Business Case (SOBC) identifies that the A585 is in the worst 10% of routes in the NW for reliability;
- A585 route is ranked 81st and 202nd on national top 250 for casualty rates;
- A585 was not originally constructed to Highways England standards but now forms part of the trunk road network;
- The South Pennines Route Bases Strategy (RBS) highlighted significant issues for cyclists and vulnerable road users. Including difficulties at junctions, difficulties crossing and navigating the road safely and poor maintenance of facilities for cyclists;
- The route runs close to the southern end of Morecambe Bay Estuary which is designated as SAC, Ramsar, SPA and Nature Improvement Area;
- Northern end of Scheme (including Skippool Bridge) and much of the southern bypass route to A586 Garstang Road East are within flood risk areas; and
- Skippool Bridge may have to be raised significantly (subject to discussion with EA).

Background – Existing Route

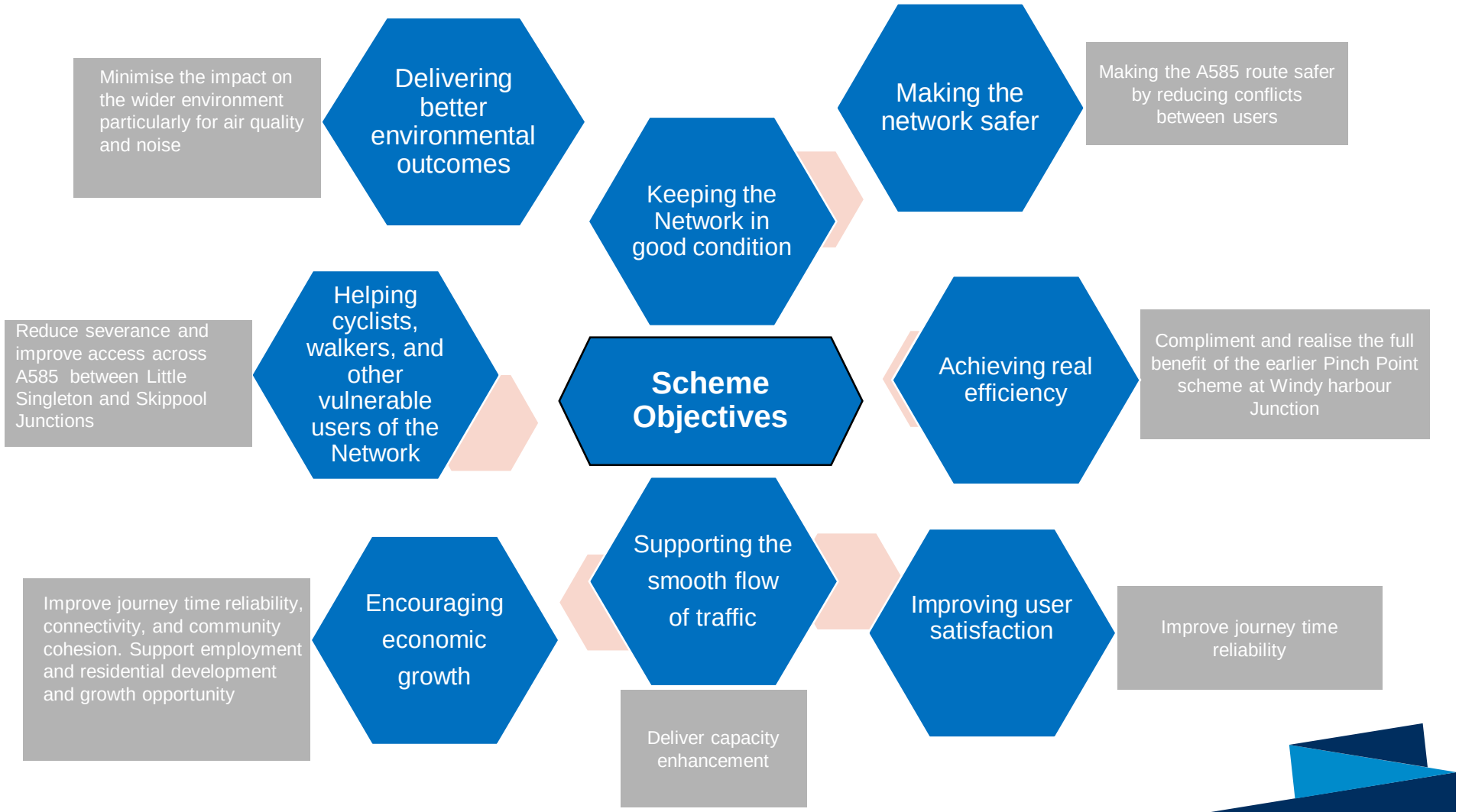
- The existing A585 within the Scheme is a 4.5km long single carriageway with 3 main junctions and extensive ribbon development fronting both sides over 3km of its length;

- A585 Mains Lane has more than 130 properties and 3 caravan parks that have direct access to the road;

- It is also used by several bus routes and has a speed limit of 40mph; and

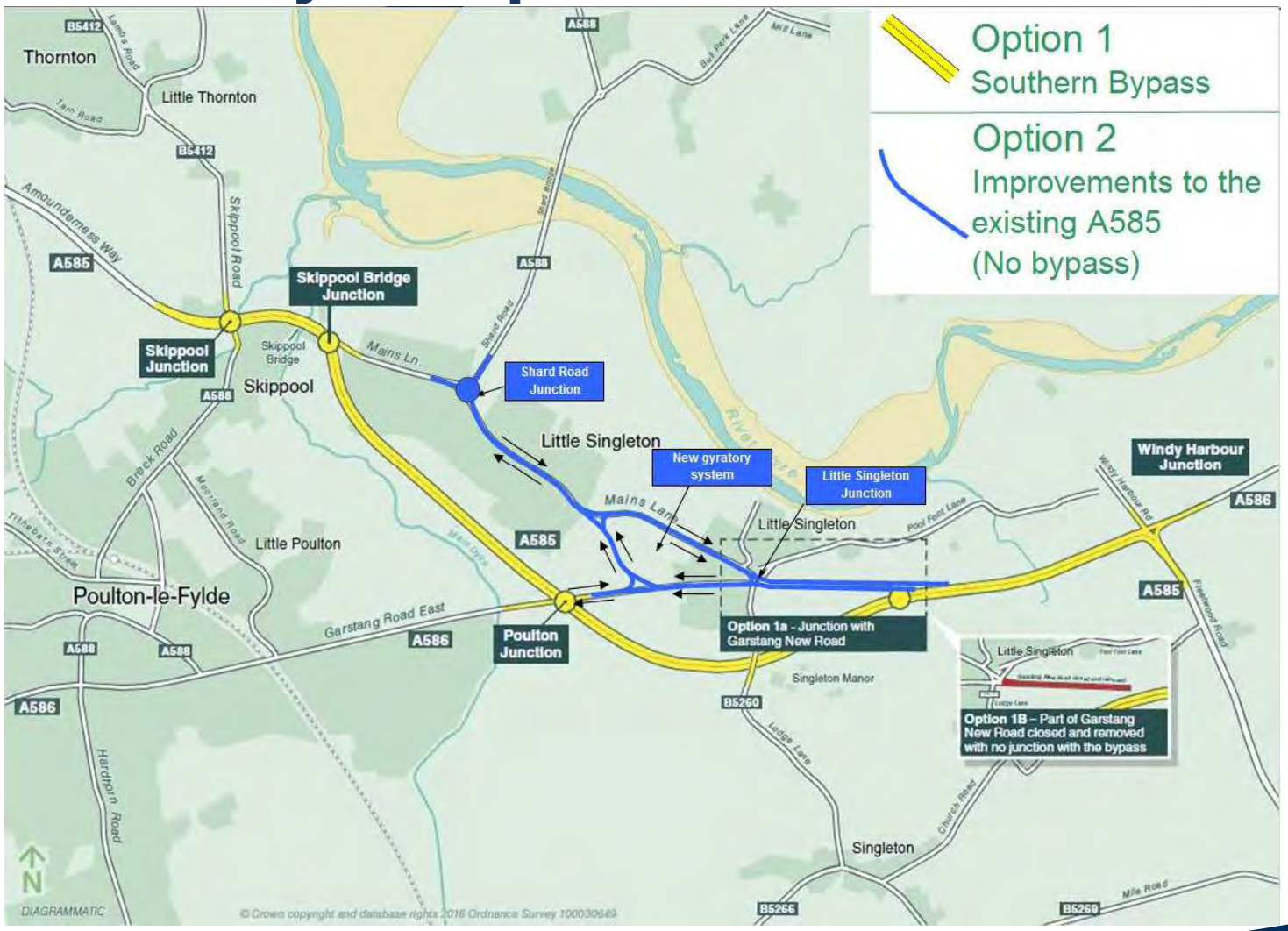
- Skippool bridge, which is over 100 years old (widened in 1920's), would need further widening for dualling and has been fitted with flood containment gates.

Scheme Objectives



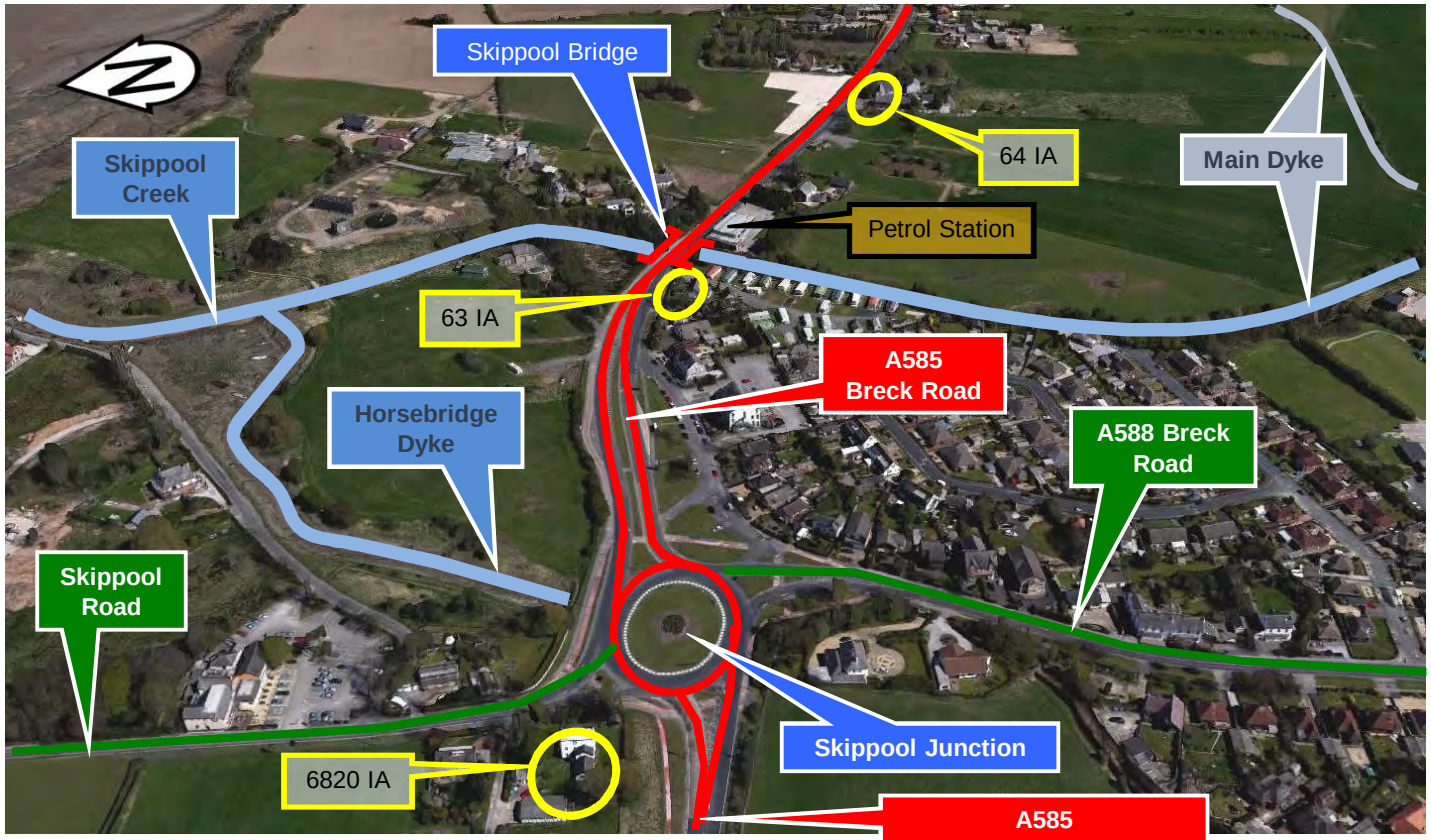
highways england

Summary of Options



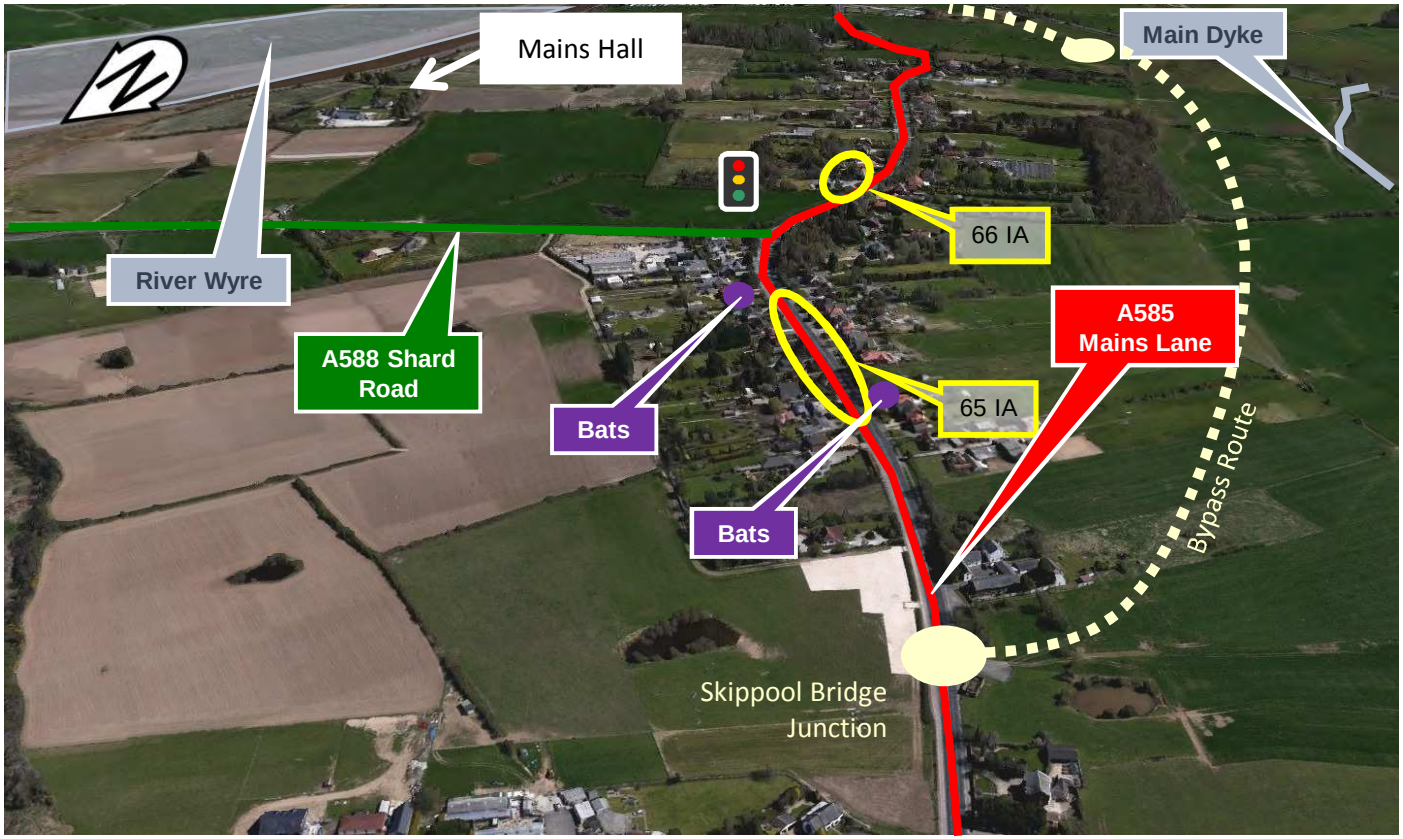
highways england

Skippool Junction and Skippool Bridge



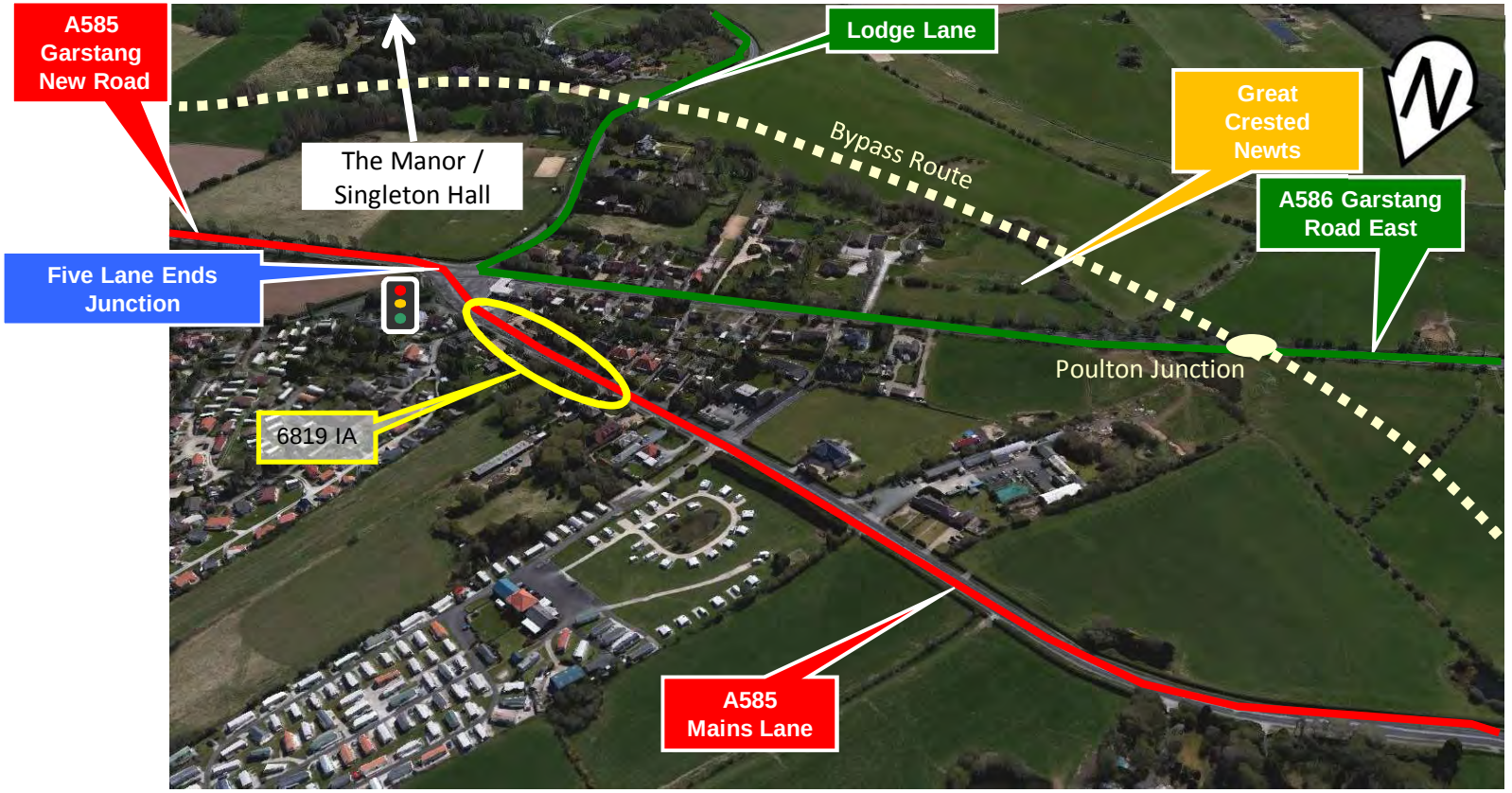
highways england

Skippool Bridge to Shard Road

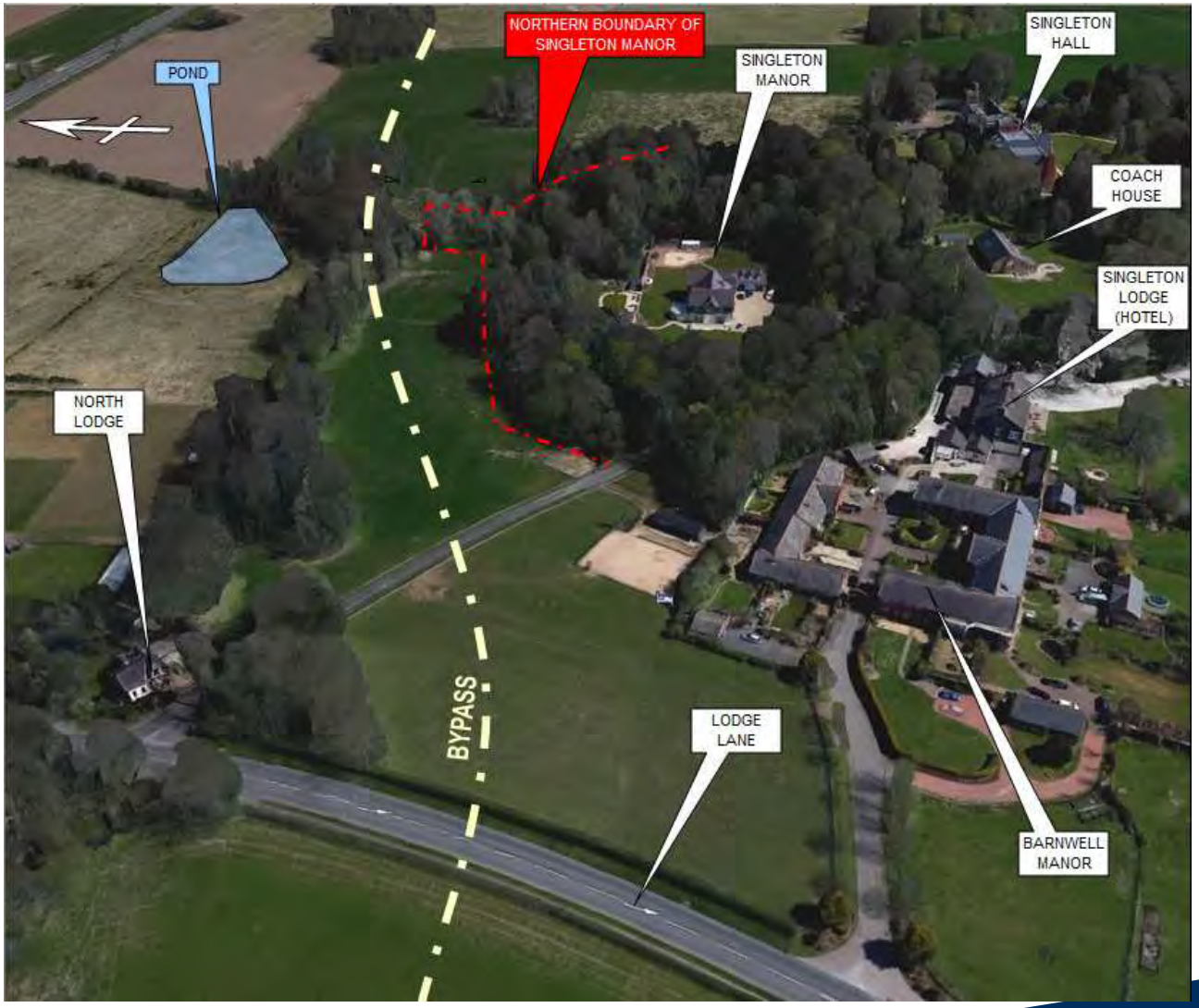


highways england

Little Singleton (Five Lane Ends Junction)

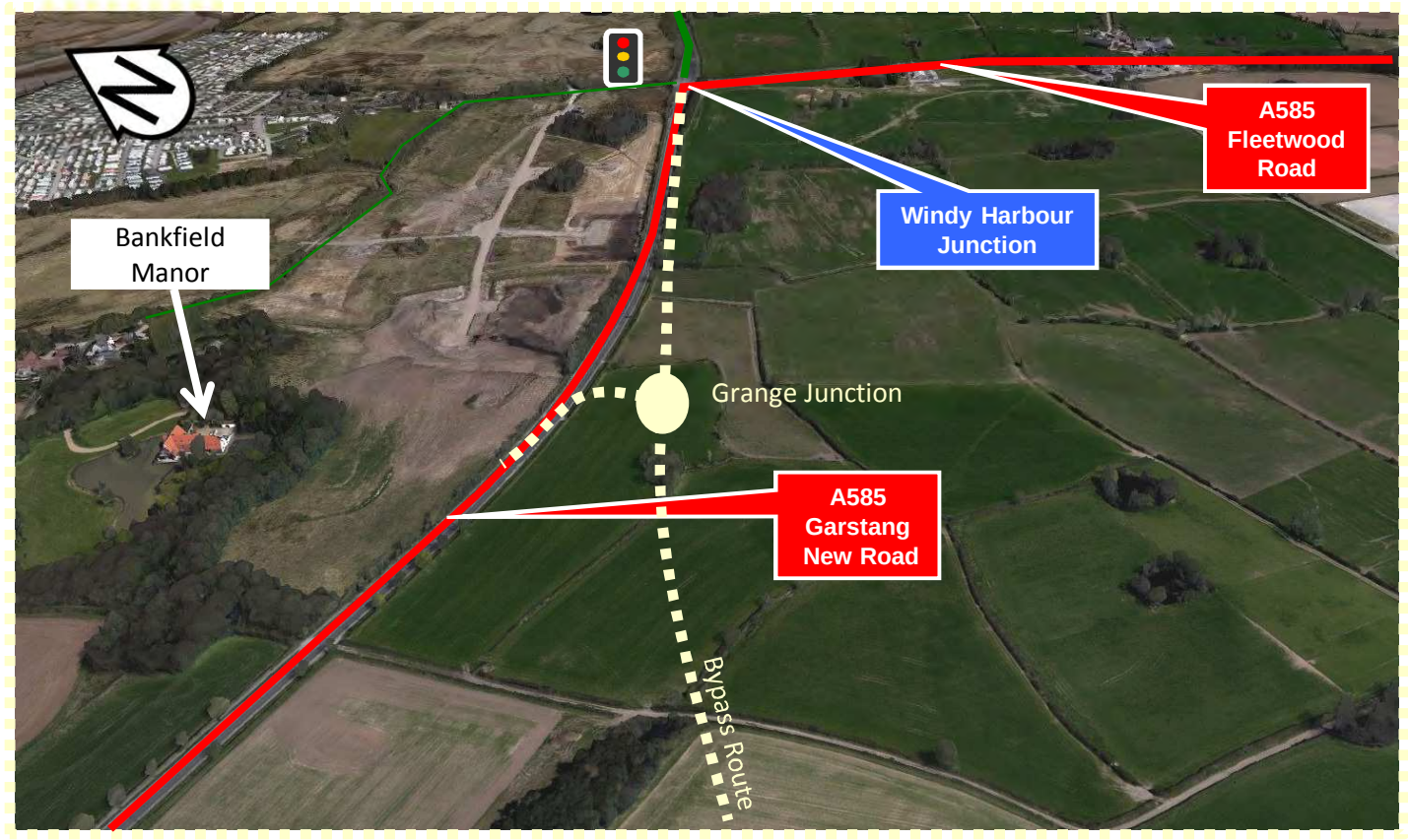


Lodge Lane (looking east)



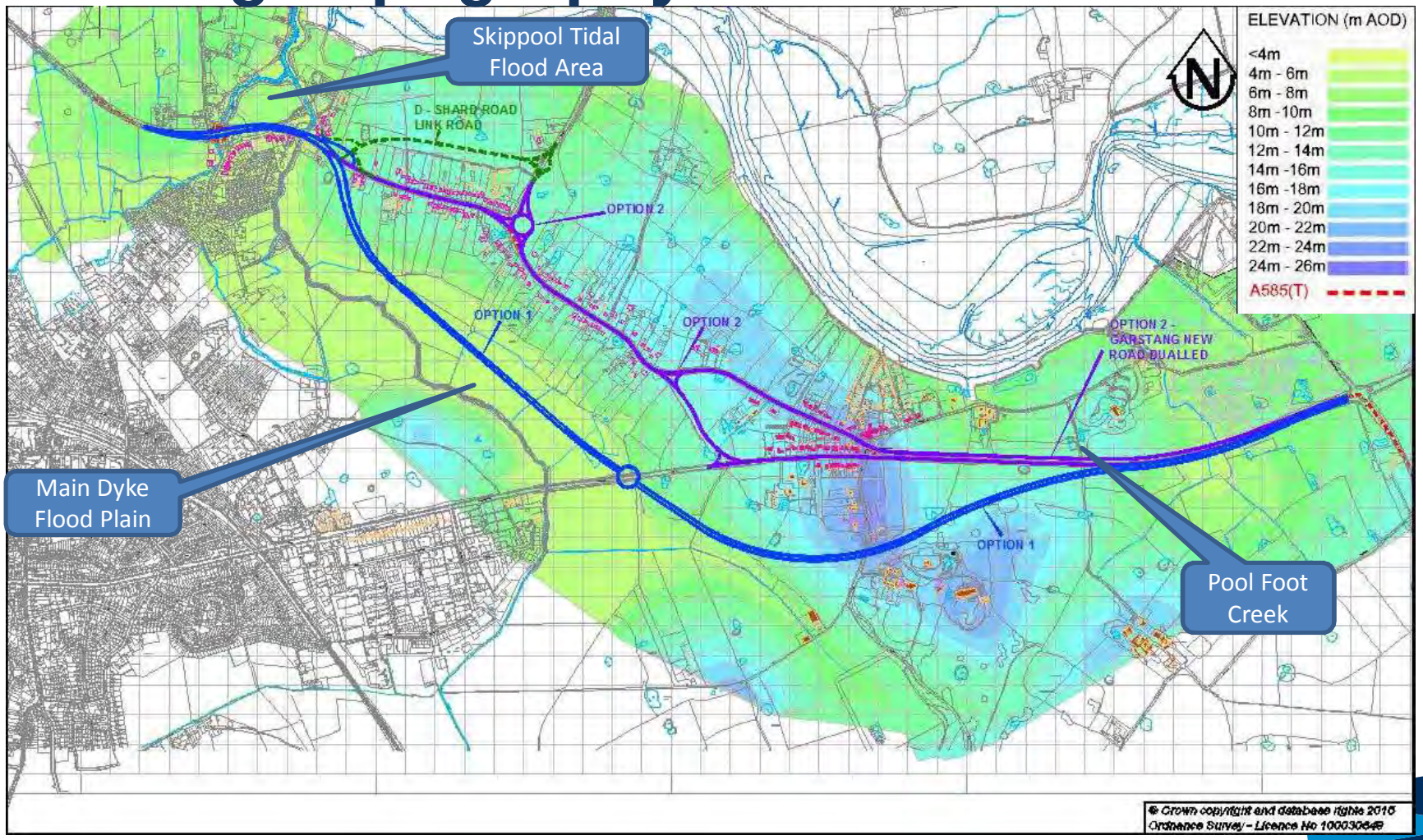
highways england

New Garstang Road and Windy Harbour Junction



highways england

Existing Topography

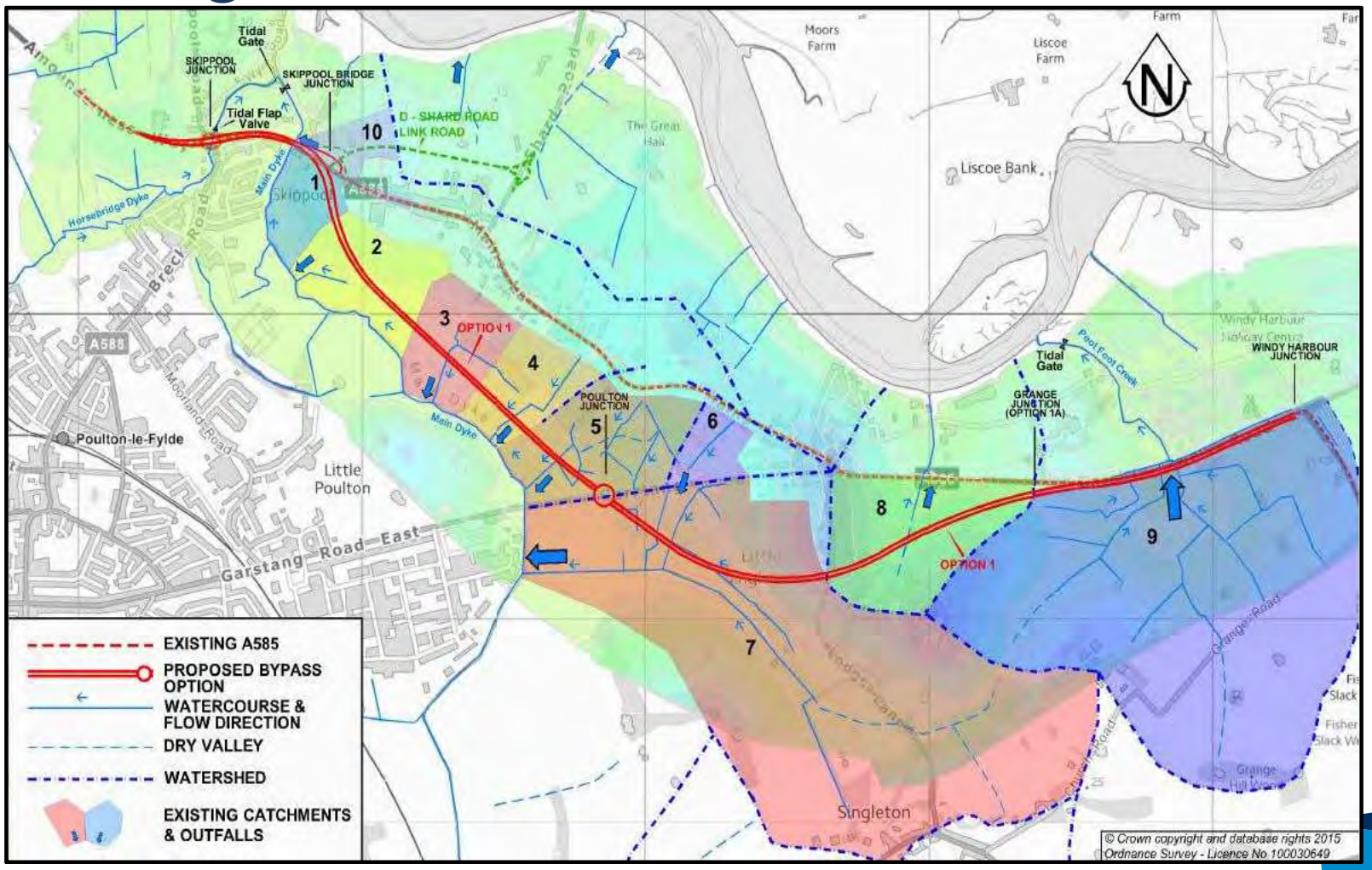


highways england

Existing Drainage – Water Environment

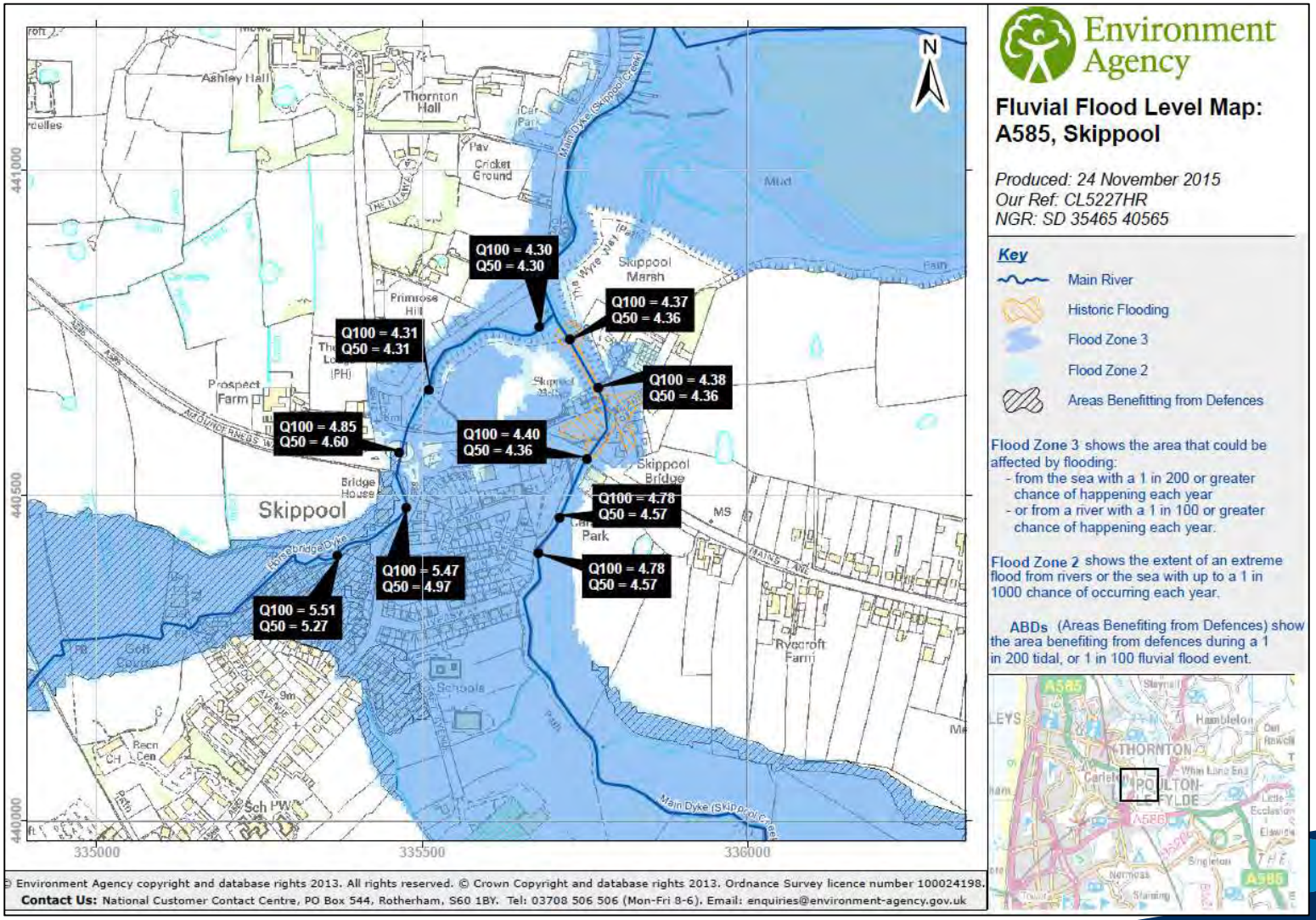
- 3no. Main Rivers (Horsebridge Dyke, Main Dyke and Pool Foot Creek);
- Groundwater condition is unknown – limited GI / survey works currently being undertaken.
- Groundwater is assumed to be present at Lodge Lane cutting due to the glacial sands / gravel cap; and
- Majority of the scheme is within flood zone 1, with a smaller portion within flood zones 2 and 3.

Existing Overland Flow Catchments



highways england

Existing Drainage – Water Environment

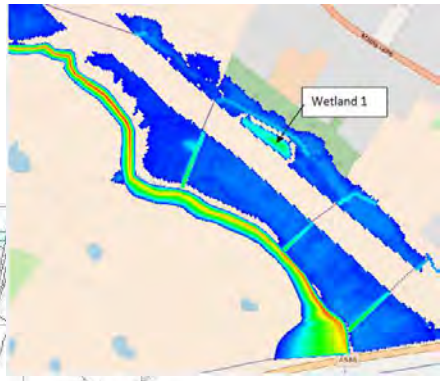


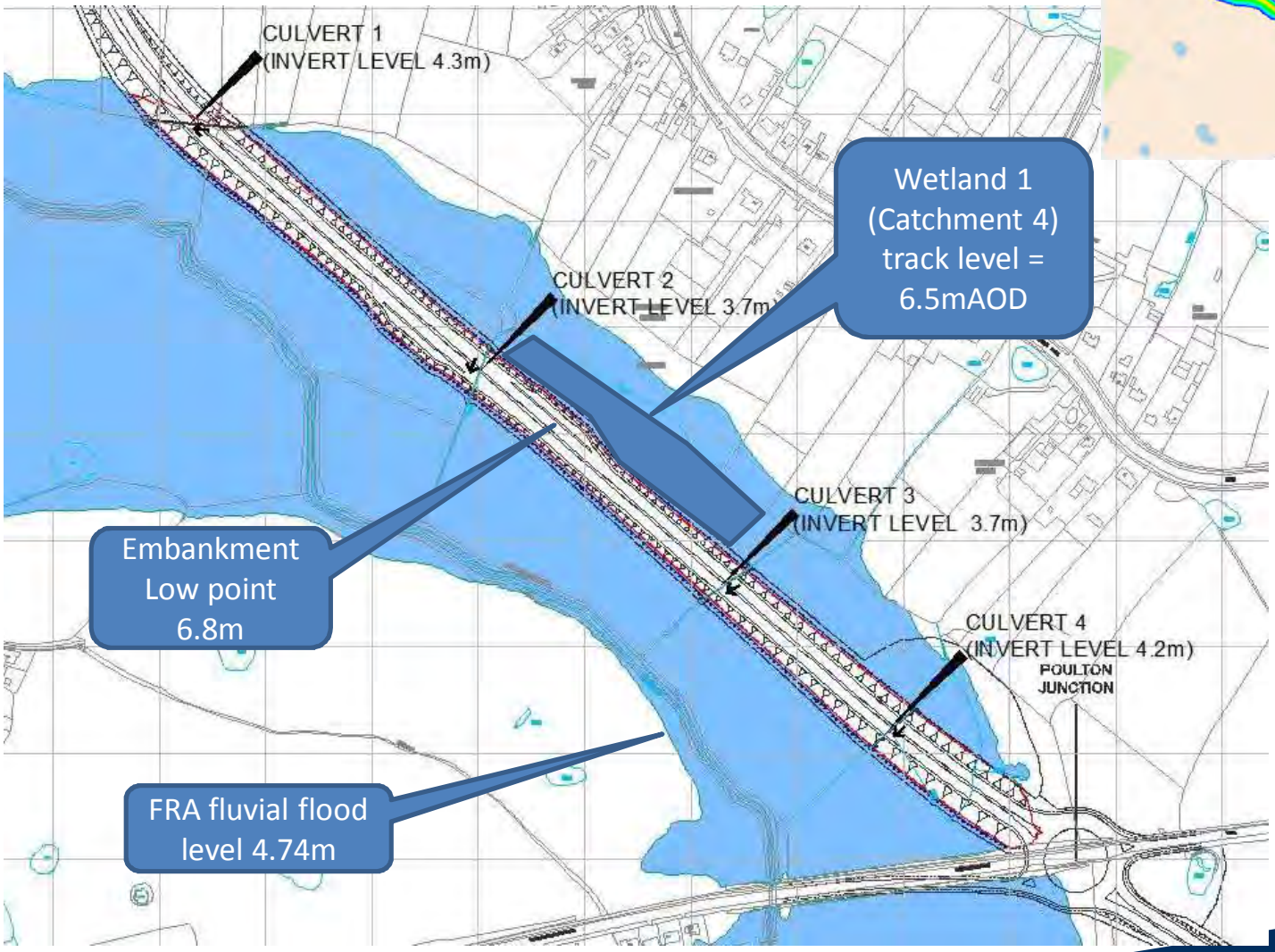
highways england

Skippool Tidal Flood Area

highways england

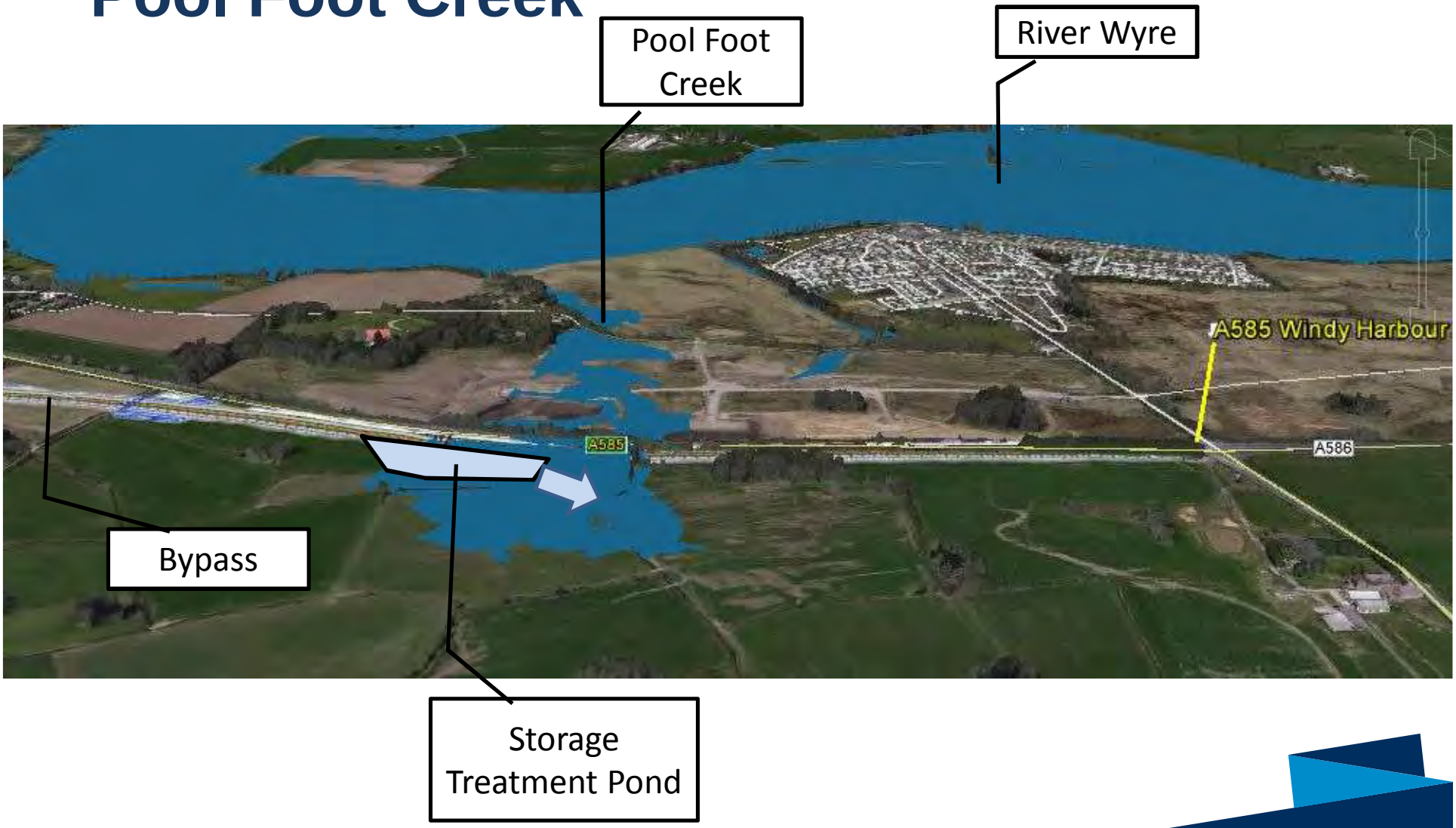
Main Dyke Flood Plain





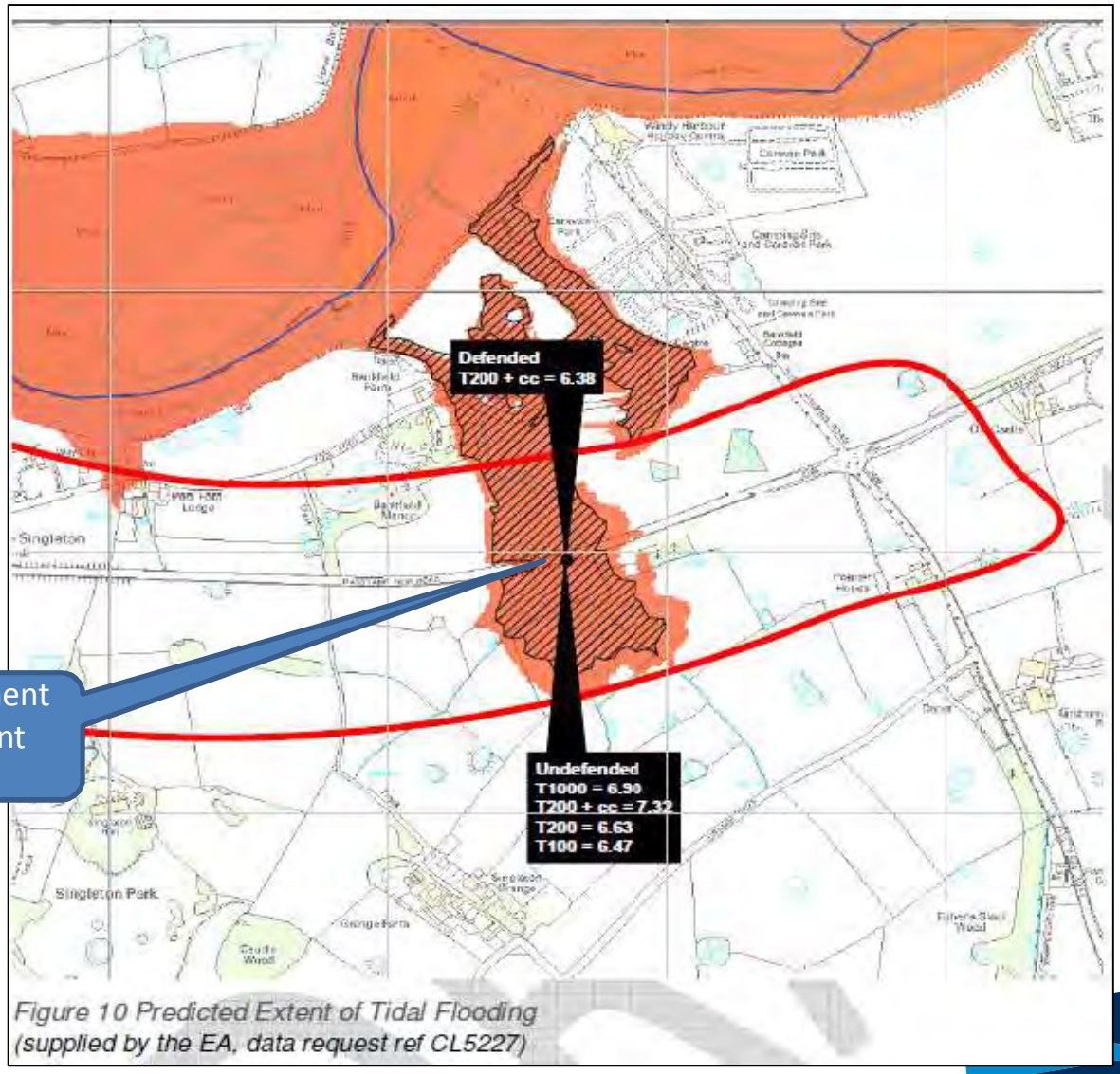
highways england

Pool Foot Creek



highways england

Pool Foot Creek



Embankment Low point 6.8m

Figure 10 Predicted Extent of Tidal Flooding (supplied by the EA, data request ref CL5227)

highways england

Existing Drainage - Data

- Limited drainage information available;
- HADMMS data used for Skippool Junction;
- As-built data used for Windy Harbour Junction;
- Limited CCTV data available for Windy Harbour and Skippool Junctions only; and
- Gap analysis plans and specification have been produced to allow CCTV asset and condition surveys to be undertaken.

Existing Drainage – System / Catchments

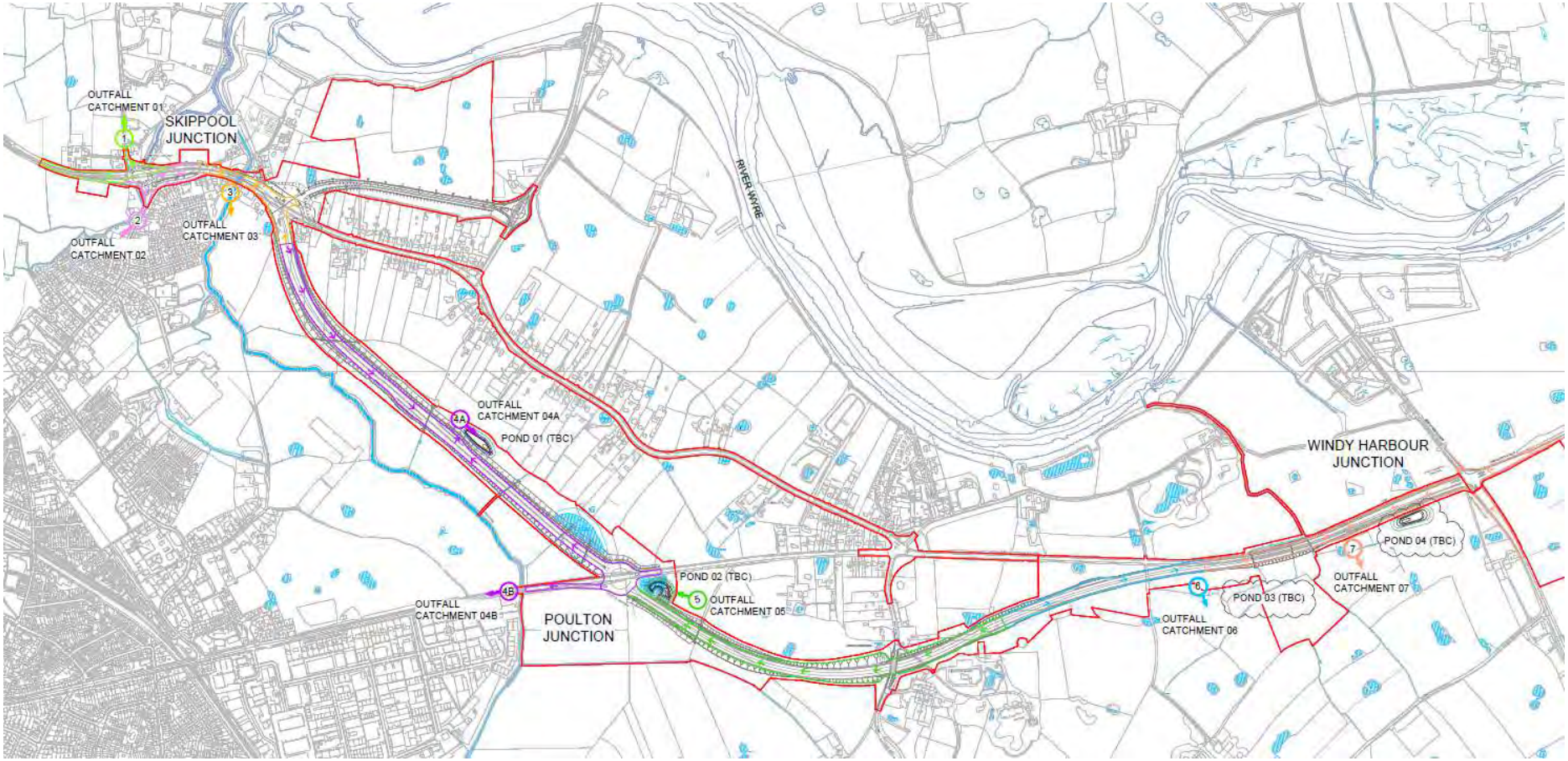
- There are currently 13no. existing drainage catchments;
- Existing highway drainage predominantly consists of gullies discharging to carrier drainage systems which outfall direct to ditches or watercourses; and
- There are currently no attenuation or pollution control measures; except for the recently updated Windy Harbour junction where CDK and oversized pipes with a penstock have been provided for spillage containment.

highways england

Proposed Drainage – Strategy

- Maintain existing drainage outfalls at tie-in locations and discharge rates;
- Separate filter drain system in Lodge Lane cutting to deal with groundwater;
- Pre-earthworks ditches and filter drains;
- No bridge deck drainage required at Skippool Bridge and Lodge Lane;
- 20% climate change allowance incorporated into the pipe design and 40% allowance in the wetland design (NPPF) ;
- Designed for maintenance;
- 5no. new 1.5m diameter culverts;
- 2no. Existing 0.9m diameter culverts to be extended; and
- HAWRAT assessment to dictate vortex separators.

Proposed Drainage - Catchments



- 7No. Catchments on the mainline; and
- 9No. Catchments if Shard Link road is included.

highways england

Proposed Drainage - Catchments

Catchment 1 and 2 :

- Maintain existing outfall to Horsebridge Dyke culvert and flow rate – oversized pipes with orifice flow control / penstock and vortex oil and grit separator.

highways england

Proposed Drainage - Catchments

Catchment 3 and 5b:

- Replacement connection to Main Dyke – oversized pipes with orifice flow control / penstock and vortex oil and grit separator.

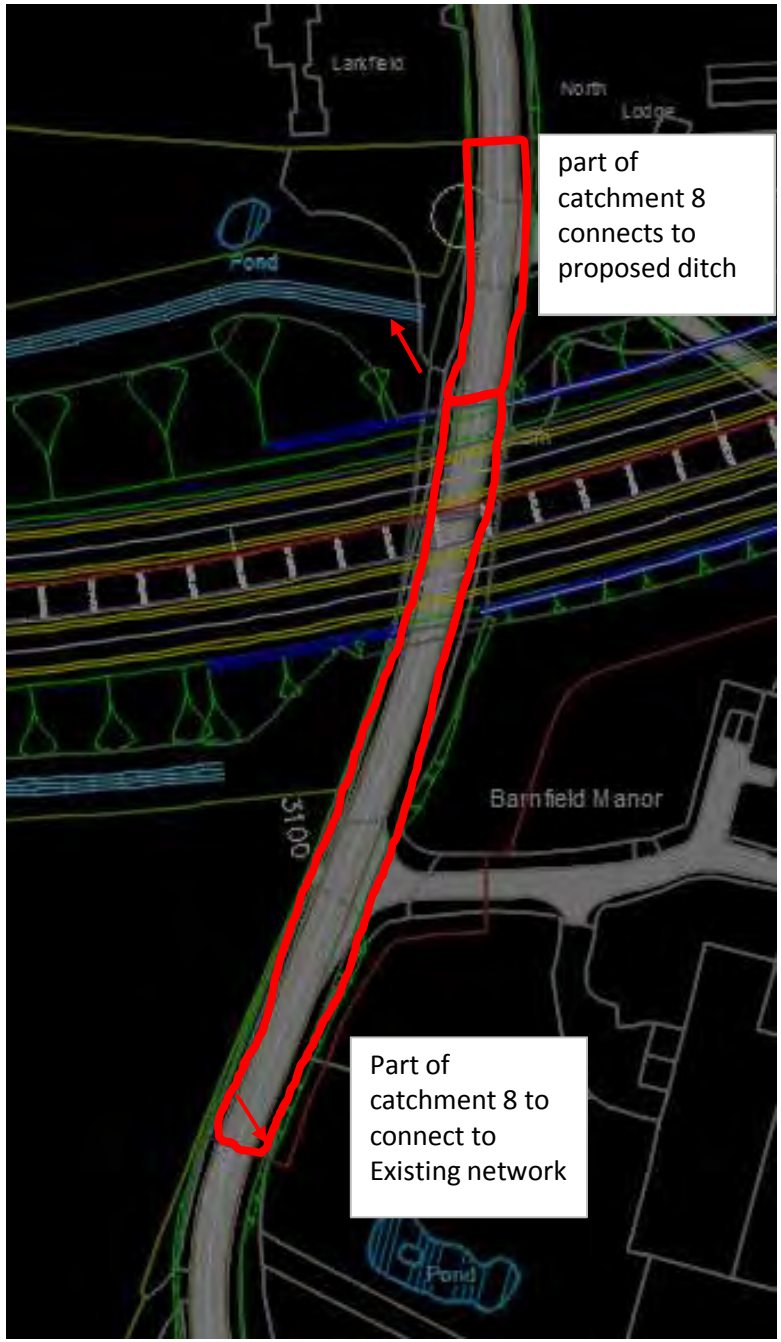
highways england

Proposed Drainage - Catchments

Catchment 4 to 7 :

- Proposed storm water drainage to discharge to existing / proposed ditches which discharge to Main Dyke – wetlands with vortex oil and grit separators.

highways england



Proposed Drainage - Catchments

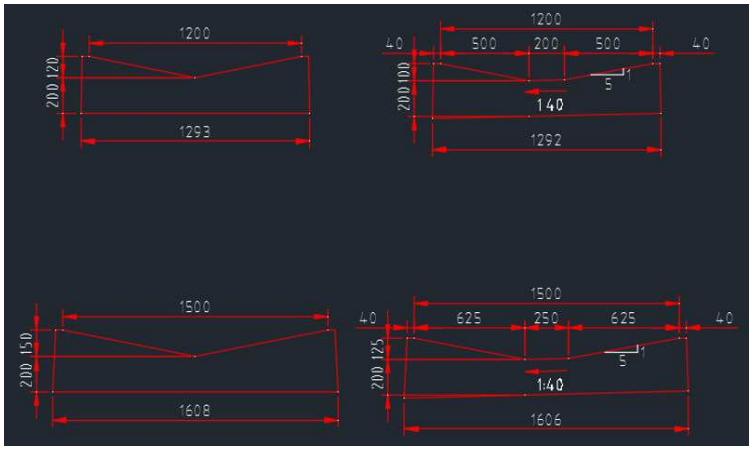
Catchment 8:

- Connection to proposed ditch and existing Network (subject to verification following CCTV asset and condition survey)

highways england

Proposed Drainage – Systems to be used

- Verge drainage to be SWC / filter drains;
- Central reserve drainage to be SWC with a separate filter drain within the large width areas;
- Junctions to be either gullies or combined kerb and drainage units; and
- SWC to be triangular (1.2m in the verge and 1.5m for central reserves).



SWC typical sections

highways england

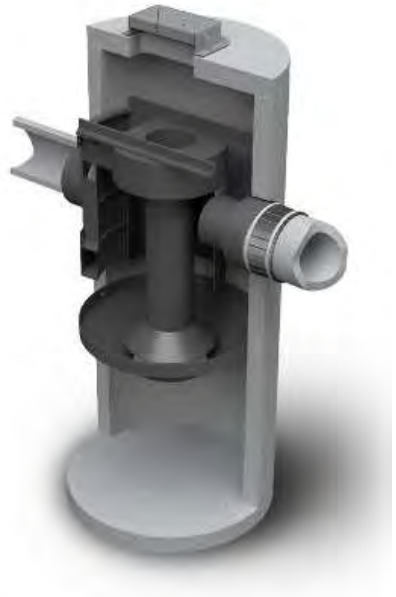
Proposed Drainage – Attenuation / Water Quality

- Oversized pipes designed to accommodate the 1 in 5 years storm return period and discharge restricted to existing discharge rates (1 in 5 year flow rates).
- Wetlands designed to accommodate 1 in 100 year storm event with a 40% allowance for climate change, discharge restricted to greenfield run-off rates.
- Wetland 1 located in flood zone 3 protected against the 1 in 100 year fluvial flood level (300mm free board); and
- Wetland maintenance access provided off network (where possible).

highways england

Proposed Drainage – Flow control / Spillage containment

- Flow control – orifice plates;
- Pollution control values – penstocks; and
- Sediment and oil removal – vortex separators.



highways england

Proposed Drainage - Departures

- Surcharging of the drainage networks during 1 in 1 year storm events.
- Increased spacing for man access chambers from a maximum of 100m to 150m; and
- Increase the diameter of a Type 7 catch-pit from 1050m diameter to accommodate larger pipes;

MINUTES

ARCADIS Design & Consultancy for natural and built assets

MEETING TITLE
A585 Windy Harbour to Skippool Improvement Scheme

CHAIR PERSON
[redacted]

DATE
30 April 2018

TIME
10:00 AM

ORGANISER
[redacted]

LOCATION
EA Office Bamber Bridge

[redacted] Highways England
e – Highways England
– Arcadis
Arcadis
rcadis
– EA

[redacted] – Arcadis
) – Arcadis
Arcadis
A
) – EA
– EA

ACTION	WHO	WHEN

1. Introduction to the Scheme / Work Completed to Date

1.1 SP gave an overview of the Scheme

1.2 CG gave an overview of the current status of the FRA / hydraulic modelling

2. Construction Phasing

2.1 SP ran through the construction phasing of the Scheme and how the bypass will be built. SP explained that it would not be feasible for the new Skippool Bridge to be constructed and in place before the road embankments for the new bypass, which cross the Main Dyke floodplain are in place. This is because the embankments require a settlement period and therefore the work on this aspect needs to start first with the construction of the bridge started after. The works need to be constructed in parallel.

2.2 SP explained that it would take 9 months for the first phase of the new Skippool Bridge to be replaced, the new larger culvert in place and all utilities diverted. Overall construction period of the Scheme would be 2 years.

2.3 PH and AH stated that there is a need to mitigate for any increases in flood risk to third parties during construction for all events up to and including 1% AEP plus 30% for climate change. Note that we only need to consider a 30% allowance for climate change as the construction phase only lasts for 9 months. Therefore, the FRA needs to identify and provide additional mitigation within the red line boundary to allow the Scheme to be constructed / phased the way it needs to be.

SP 16/05/2018

ACTION	WHO	WHEN
2.4 AH asked if there were any schematics they could be sent of the new Skippool Bridge. SP said there are draft drawings and he would email them to AH.		
2.5 PH stated that there are significant issues with PR / local community flooding and awareness would need to be considered.		
3. Tidal Modelling		
3.1 CG provided background to the tidal model and asked the EA about acceptable tolerances [CG also noted that it appears the central reserve at Skippool Junction (locally known as the River Wyre Junction after the pub) is controlling tidal flooding]		
3.2 PH / AH and PS said there wasn't a simple answer to this and that they would have to take this query away and look at reasonable tolerances.	AH	As part of the FRA review process.
3.3 CG to liaise with the EA over tolerances for increases in levels – i.e. what would be considered a detriment and what is acceptable within the bounds of model / data accuracy.	CG	As part of the FRA review process.
4. Flood Risk During Construction		
4.1 PH stated that flood risk during construction should be covered within the FRA and that detail of site compounds and haul roads should be provided.		
4.2 Arcadis noted that they have site compound locations but are awaiting the appointment of a buildability consultant to confirm haul roads.		
4.3 AH outlined the FRA needs to consider any temporary changes in ground levels in relation to site compounds / haul roads.		
4.4 PH and PS stated that the FRA needs to consider key receptors and their vulnerabilities and to ensure there would be no detriment to third parties and that run off is controlled.		
5. Timescales		
5.1 KB gave a brief overview of the DCO submission timescales and queried the EAs review timescales. PS confirmed that the EA would need 6 weeks for model reviews (to be carried out by external consultants on behalf of the EA).		
5.2 PS also said he was happy for the EA to review the model and would be easier to work with us. PS stated a preference to receiving everything all at once rather than being drip fed. **Post note – AH has agreed that CG can send just the baseline and with scheme fluvial models prior to completing the mitigation model.**		
5.3 AH said anything that is being submitted though to the EA should go through him as the first point of contact.		
5.4 PH Suggested that the EA could also offer permitting advice.		

ACTION	WHO	WHEN

6. AOB

6.1 Future Planning Applications – PH noted there are a lot of development proposed in this area therefore it is critical to take account of this in the FRA i.e. what is rural land now may not be in future. KB noted she maintains a register of potential cumulative developments which is regularly updated.

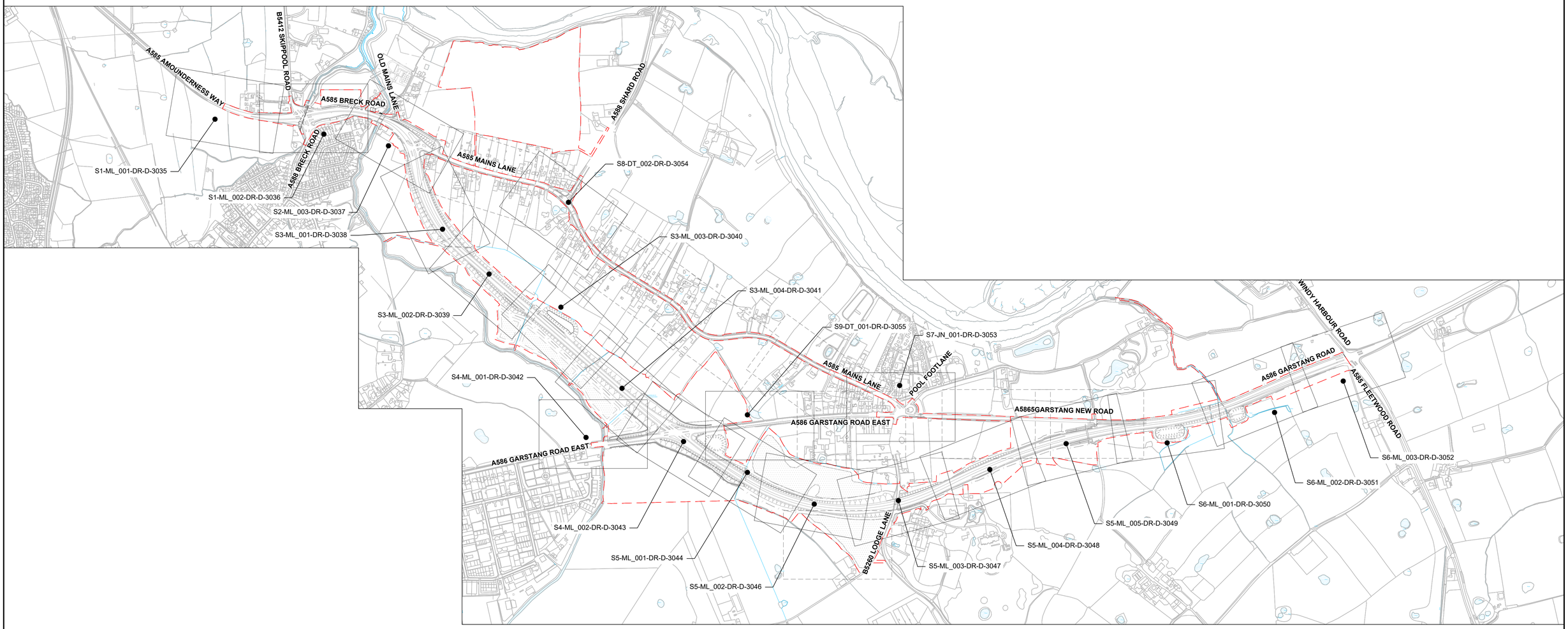
6.2 The EA noted left bank of Horsebridge Dyke (just by the ‘d’ in Breck Road on OS opensource mapping) there is an application for ‘agricultural access’ and it is likely this may be a precursor to future housing development - Wyre Council Ref: 18/00243/FUL.

6.3 The EA noted there should be no drainage ponds in FZ3 – and this needs to clearly be identified in the FRA.

6.4 SP outlined the preliminary drainage design. New outfalls are designed in accordance with current standards. There are 2 general designs for new outfalls, first of which discharges to wetlands before discharging to highway ditches and ultimately into local watercourse. Arcadis have gained agreement with Lancashire County Council for this. Wetlands have been designed to accommodate a 1 in 100-year storm with 40% climate change allowance. Second discharges directly into watercourse, consents/permits for these will be sought at detail design stage.

6.5 SP stated where existing outfalls will be maintained and re-used, the design has maintained the existing 1 in 5-year discharge rate by providing attenuation and water quality mitigation.

Appendix G – Proposed drainage catchment plan and proposed drainage plans



KEY PLAN LEGEND

DRAWING LAYOUT USED

DRAWING LAYOUT NOT USED

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

Client: highways england

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
The Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE KEY PLAN

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-SZ-GN_000-DR-D-3031

100mm on Original

Print Date:

File Path:

PROPOSED DRAINAGE LEGEND :

REDLINE BOUNDARY

PROPOSED ROAD LAYOUT

ORDNANCE SURVEY

CKD1-001 CKD — CKD — EXISTING COMBINED KERB AND DRAINAGE SYSTEM TO BE RETAINED

300 Ø — EXISTING PIPE TO BE RETAINED

300 Ø — EXISTING CARRIER DRAIN TO BE RELOCATED / ADJUSTED

300 Ø — PROPOSED CARRIER DRAIN

600 Ø — PROPOSED STORAGE PIPE

150 Ø FDR — FDR — PROPOSED FILTER DRAIN

100 Ø FIN — FIN — PROPOSED FIN DRAIN

CKD01-001 CKD — CKD — PROPOSED KERB AND DRAINAGE SYSTEM

225 Ø CCF — CCF — PROPOSED COMBINED CARRIER FILTER PIPE

LD01-001 LDC — LDC — PROPOSED LINEAR DRAINAGE CHANNEL

SW01-002 SWC — SWC — PROPOSED STORM WATER CHANNEL

SW01-002 SWC — SWC 300 Ø — PROPOSED STORM WATER CHANNEL (BELOW)

M1-001/C1-001 — EXISTING MANHOLE / CATCHPIT WITH REFERENCE NUMBER TO BE RELOCATED AND REINSTATED

EXM1-001/EXC1-001 — EXISTING MANHOLE / CATCHPIT WITH REFERENCE NUMBER

M1-001/C1-001 — PROPOSED MANHOLE / CATCHPIT WITH REFERENCE NUMBER

S5-018-2 — PROPOSED SURFACE WATER OUTFALL CHAMBER WITH NO. OF PAIRS GRATING

R4-01 — PROPOSED RODDING EYE CHAMBER WITH REFERENCE NUMBER

K1-001 — PROPOSED CDK ACCESS / OUTFALL CHAMBER WITH REFERENCE NUMBER

M1-P-01 — PROPOSED VORTEX GRIT SEPARATOR

M1-F-01 — PROPOSED MANHOLE WITH FLOW CONTROL

EXG1-001 — EXISTING GULLY WITH REFERENCE NUMBER

G1-001 — PROPOSED GULLY WITH REFERENCE NUMBER

EXG1-001 — EXISTING GULLY WITH REFERENCE NUMBER TO BE RELOCATED AND REINSTATED

DI-DN006 — PROPOSED DRAINAGE DITCH WITH REFERENCE NUMBER

PROPOSED HEADWALL

EXISTING HEADWALL

PIPE FLOW ARROW

CARRIAGEWAY ROLL-OVER

H107 — SAFETY, HEALTH AND ENVIRONMENT INFORMATION

HIGH POINT

LOW POINT

PROPOSED STORM WATER WETLAND

O1-01 — PROPOSED OUTFALL

O1-01 — EXISTING OUTFALL TO BE RETAINED

DITCH FLOW ARROW

EXISTING WATERBODIES

EXISTING WATERCOURSE

PROPOSED CULVERT WITH HEADWALL

PROPOSED BADGER TUNNEL

PROPOSED FENCING LINE

PROPOSED PIPED DITCH WITH HEADWALL

PROPOSED FOOT OVER BRIDGE

SZ-ML_001-DR-D-3035 — DRAWING NUMBER

S5|018|2
- NUMBER OF GRATINGS FOR STORM WATER CHANNEL ONLY
- SERIAL NUMBER
- CATCHMENT NUMBER

DRAINAGE GENERAL NOTES :

1. ALL PIPE SIZES ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS STATED OTHERWISE.
2. WRITTEN SCALES (EG. 1:500, ETC.) APPLY TO DRAWINGS AT A1 PAPER SIZE UNLESS NOTED OTHERWISE.
3. DO NOT SCALE DIRECTLY FROM DRAWINGS, USE FIGURED DIMENSIONS ONLY.
4. FOR EXISTING DRAINAGE LAYOUT PLANS REFER TO HE548643-ARC-HDG-SZ-GN000-DR-D-3071 TO 3089.
5. THE OUTFALL MARKERS SHOW THE FINAL OUTFALL LOCATION TO THE RECEIVING WATER COURSE AND AS SUCH MAY NOT BE DIRECTLY ADJACENT TO PROPOSED DRAINAGE CATCHMENT.
6. ALL SWC WILL REQUIRE FIN DRAINS UNLESS FDR HAVE BEEN PROPOSED.
7. FOR PROPOSED WETLAND SECTION AND LEVELS REFER DRAWINGS NUMBER HE548643-ARC-HDG-SZ-GN000-DE-D-3059 TO 3063.
8. EXISTING MANHOLES AND GULLIES TO BE REINSTATED TO MATCH THE FINAL SURFACE LEVEL.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE NOTES AND LEGEND

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DR-D-3032

100mm on Original

Print Date:

File Path:

LIST OF DRAWINGS

PROPOSED DRAWINGS	
PROPOSED DRAINAGE KEY PLAN	HE548643-ARC-HDG-SZ-GN_000-DR-D-3031
PROPOSED DRAINAGE NOTES AND LEGEND	HE548643-ARC-HDG-SZ-GN_000-DR-D-3032
DRAINAGE LIST OF DRAWINGS	HE548643-ARC-HDG-SZ-GN_000-DR-D-3033
PROPOSED DRAINAGE CATCHMENT PLAN	HE548643-ARC-HDG-SZ-GN_000-DR-D-3034
PROPOSED DRAINAGE PLAN SHEET 1 OF 20	HE548643-ARC-HDG-S1-ML_001-DR-D-3035
PROPOSED DRAINAGE PLAN SHEET 2 OF 20	HE548643-ARC-HDG-S1-ML_002-DR-D-3036
PROPOSED DRAINAGE PLAN SHEET 3 OF 20	HE548643-ARC-HDG-S2-ML_003-DR-D-3037
PROPOSED DRAINAGE PLAN SHEET 4 OF 20	HE548643-ARC-HDG-S3-ML_001-DR-D-3038
PROPOSED DRAINAGE PLAN SHEET 5 OF 20	HE548643-ARC-HDG-S3-ML_002-DR-D-3039
PROPOSED DRAINAGE PLAN SHEET 6 OF 20	HE548643-ARC-HDG-S3-ML_003-DR-D-3040
PROPOSED DRAINAGE PLAN SHEET 7 OF 20	HE548643-ARC-HDG-S3-ML_004-DR-D-3041
PROPOSED DRAINAGE PLAN SHEET 8 OF 20	HE548643-ARC-HDG-S4-ML_001-DR-D-3042
PROPOSED DRAINAGE PLAN SHEET 9 OF 20	HE548643-ARC-HDG-S4-ML_002-DR-D-3043
PROPOSED DRAINAGE PLAN SHEET 10 OF 20	HE548643-ARC-HDG-S5-ML_001-DR-D-3044
PROPOSED DRAINAGE PLAN SHEET 11 OF 20	HE548643-ARC-HDG-S5-ML_002-DR-D-3046
PROPOSED DRAINAGE PLAN SHEET 12 OF 20	HE548643-ARC-HDG-S5-ML_003-DR-D-3047
PROPOSED DRAINAGE PLAN SHEET 13 OF 20	HE548643-ARC-HDG-S5-ML_004-DR-D-3048
PROPOSED DRAINAGE PLAN SHEET 14 OF 20	HE548643-ARC-HDG-S5-ML_005-DR-D-3049
PROPOSED DRAINAGE PLAN SHEET 15 OF 20	HE548643-ARC-HDG-S6-ML_001-DR-D-3050
PROPOSED DRAINAGE PLAN SHEET 16 OF 20	HE548643-ARC-HDG-S6-ML_002-DR-D-3051
PROPOSED DRAINAGE PLAN SHEET 17 OF 20	HE548643-ARC-HDG-S6-ML_003-DR-D-3052
PROPOSED DRAINAGE PLAN SHEET 18 OF 20	HE548643-ARC-HDG-S7-JN_001-DR-D-3053
PROPOSED DRAINAGE PLAN SHEET 19 OF 20	HE548643-ARC-HDG-S8-DT_002-DR-D-3054
PROPOSED DRAINAGE PLAN SHEET 20 OF 20	HE548643-ARC-HDG-S9-DT_001-DR-D-3055
PROPOSED DRAINAGE DETAILS AND SECTIONS	
SURFACE WATER CHANNEL DETAILS 1PAIR INTERMEDIATE	HE548643-ARC-HDG-SZ-GN_000-DE-D-3056
SURFACE WATER CHANNEL DETAILS 2PAIR INTERMEDIATE	HE548643-ARC-HDG-SZ-GN_000-DE-D-3057
SURFACE WATER CHANNEL DETAILS 3PAIR INTERMEDIATE	HE548643-ARC-HDG-SZ-GN_000-DE-D-3058
SURFACE WATER CHANNEL DETAILS 1PAIR TERMINAL	HE548643-ARC-HDG-SZ-GN_000-DE-D-3059
SURFACE WATER CHANNEL DETAILS 2PAIR TERMINAL	HE548643-ARC-HDG-SZ-GN_000-DE-D-3060
SURFACE WATER CHANNEL DETAILS 3PAIR TERMINAL	HE548643-ARC-HDG-SZ-GN_000-DE-D-3061
PROPOSED DRAINAGE PENSTOCK AND OFFICE CHAMBER TYPICAL DETAILS	HE548643-ARC-HDG-SZ-GN_000-DE-D-3062
DRAINAGE STROMEWATER WETLAND 1 PLAN AND SECTION	HE548643-ARC-HDG-SZ-GN_000-DE-D-3063
DRAINAGE STROMEWATER WETLAND 2 PLAN AND SECTION	HE548643-ARC-HDG-SZ-GN_000-DE-D-3064
DRAINAGE STROMEWATER WETLAND 3 PLAN AND SECTION	HE548643-ARC-HDG-SZ-GN_000-DE-D-3065
DRAINAGE STROMEWATER WETLAND 4 PLAN AND SECTION	HE548643-ARC-HDG-SZ-GN_000-DE-D-3066
DRAINAGE STROMEWATER WETLAND STANDARD DETAILS	HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
PLAN AND SECTION FOR PROPOSED CULVERT 1 AT CHAINAGE 1+140	HE548643-ARC-HDG-SZ-GN_000-DE-D-3068
PLAN AND SECTION FOR PROPOSED CULVERT 2 AT CHAINAGE 1+490	HE548643-ARC-HDG-SZ-GN_000-DE-D-3069
PLAN AND SECTION FOR PROPOSED CULVERT 3 AT CHAINAGE 1+795	HE548643-ARC-HDG-SZ-GN_000-DE-D-3070
PLAN AND SECTION FOR PROPOSED CULVERT 4 AT CHAINAGE 2+005	HE548643-ARC-HDG-SZ-GN_000-DE-D-3071
PLAN AND SECTION FOR PROPOSED CULVERT 5 AT CHAINAGE 2+490	HE548643-ARC-HDG-SZ-GN_000-DE-D-3072
PLAN AND SECTION FOR EXISTING CULVERT 7 AT CHAINAGE 4+300	HE548643-ARC-HDG-SZ-GN_000-DE-D-3073
PLAN AND SECTION FOR EXISTING CULVERT 6 AT CHAINAGE 4+350	HE548643-ARC-HDG-SZ-GN_000-DE-D-3074

EXISTING DRAWINGS	
EXISTING DRAINAGE AND SITE CLEARANCE KEY PLAN	HE548643-ARC-HDG-SZ-GN_000-DR-D-3075
EXISTING DRAINAGE AND SITE CLEARANCE NOTES AND LEGEND	HE548643-ARC-HDG-SZ-GN_000-DR-D-3076
EXISTING DRAINAGE AND SITE CLEARANCE CATCHMENT PLAN	HE548643-ARC-HDG-SZ-GN_000-DR-D-3077
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 1 OF 20	HE548643-ARC-HDG-S1-ML_001-DR-D-3078
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 2 OF 20	HE548643-ARC-HDG-S1-ML_002-DR-D-3079
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 3 OF 20	HE548643-ARC-HDG-S2-ML_003-DR-D-3080
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 4 OF 20	HE548643-ARC-HDG-S8-DT_001-DR-D-3081
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 5 OF 20	HE548643-ARC-HDG-S8-DT_002-DR-D-3082
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 6 OF 20	HE548643-ARC-HDG-S8-DT_003-DR-D-3083
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 7 OF 20	HE548643-ARC-HDG-S8-DT_004-DR-D-3084
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 8 OF 20	HE548643-ARC-HDG-S8-DT_005-DR-D-3085
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 9 OF 20	HE548643-ARC-HDG-S7-JN_001-DR-D-3086
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 10 OF 20	HE548643-ARC-HDG-S10-DT_008-DR-D-3087
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 11 OF 20	HE548643-ARC-HDG-S10-DT_009-DR-D-3088
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 12 OF 20	HE548643-ARC-HDG-S6-ML_001-DR-D-3089
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 13 OF 20	HE548643-ARC-HDG-S6-ML_002-DR-D-3090
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 14 OF 20	HE548643-ARC-HDG-S6-ML_003-DR-D-3091
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 15 OF 20	HE548643-ARC-HDG-S9-DT_001-DR-D-3092
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 16 OF 20	HE548643-ARC-HDG-S9-DT_002-DR-D-3093
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 17 OF 20	HE548643-ARC-HDG-S4-ML002-DR-D-3094
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 18 OF 20	HE548643-ARC-HDG-S4-ML002-DR-D-3095
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 19 OF 20	HE548643-ARC-HDG-S5-ML003-DR-D-3096
EXISTING DRAINAGE AND SITE CLEARANCE PLAN SHEET 20 OF 20	HE548643-ARC-HDG-S5-ML006-DR-D-3097

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: DRAINAGE LIST OF DRAWINGS

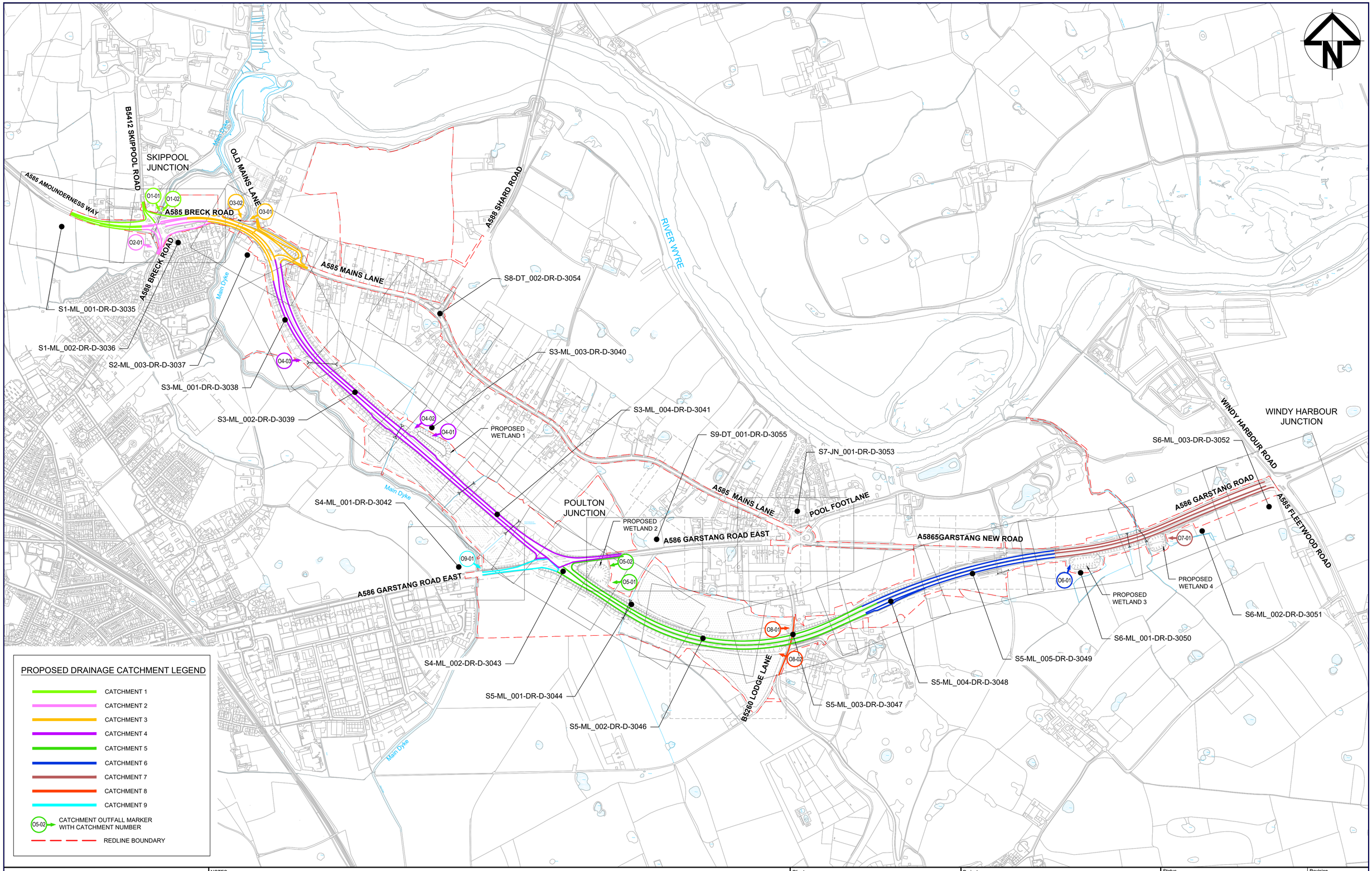
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DR-D-3033

100mm on Original

Print Date:

File Path:



NOTES

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE CATCHMENT PLAN

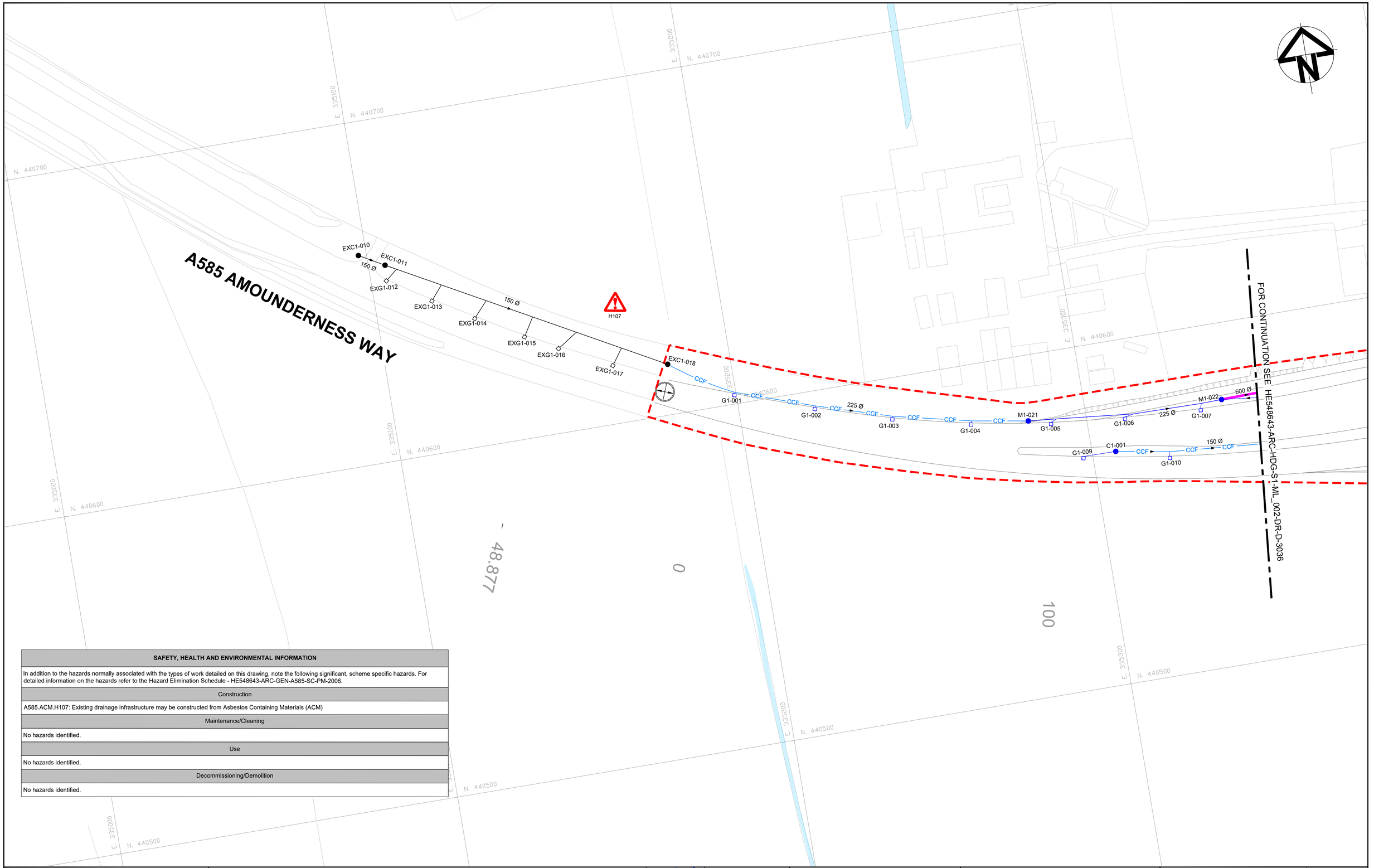
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-SZ-GN_000-DR-D-3034

100mm on Original

Print Date:

File Path:



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN_000-DR-D-3032

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 1 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S1-ML_001-DR-D-3035

100mm on Original

Print Date:

File Path:

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H108: Inundation of flood water
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

B5412 SKIPPOOL ROAD

AMOUNDERNESS WAY

A585 BRECK ROAD

A588 BRECK ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-S1-ML_001-DR-D-3035

FOR CONTINUATION SEE HE548643-ARC-HDG-S2-ML_003-DR-D-3037

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN_000-DR-D-3032

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 2 OF 20

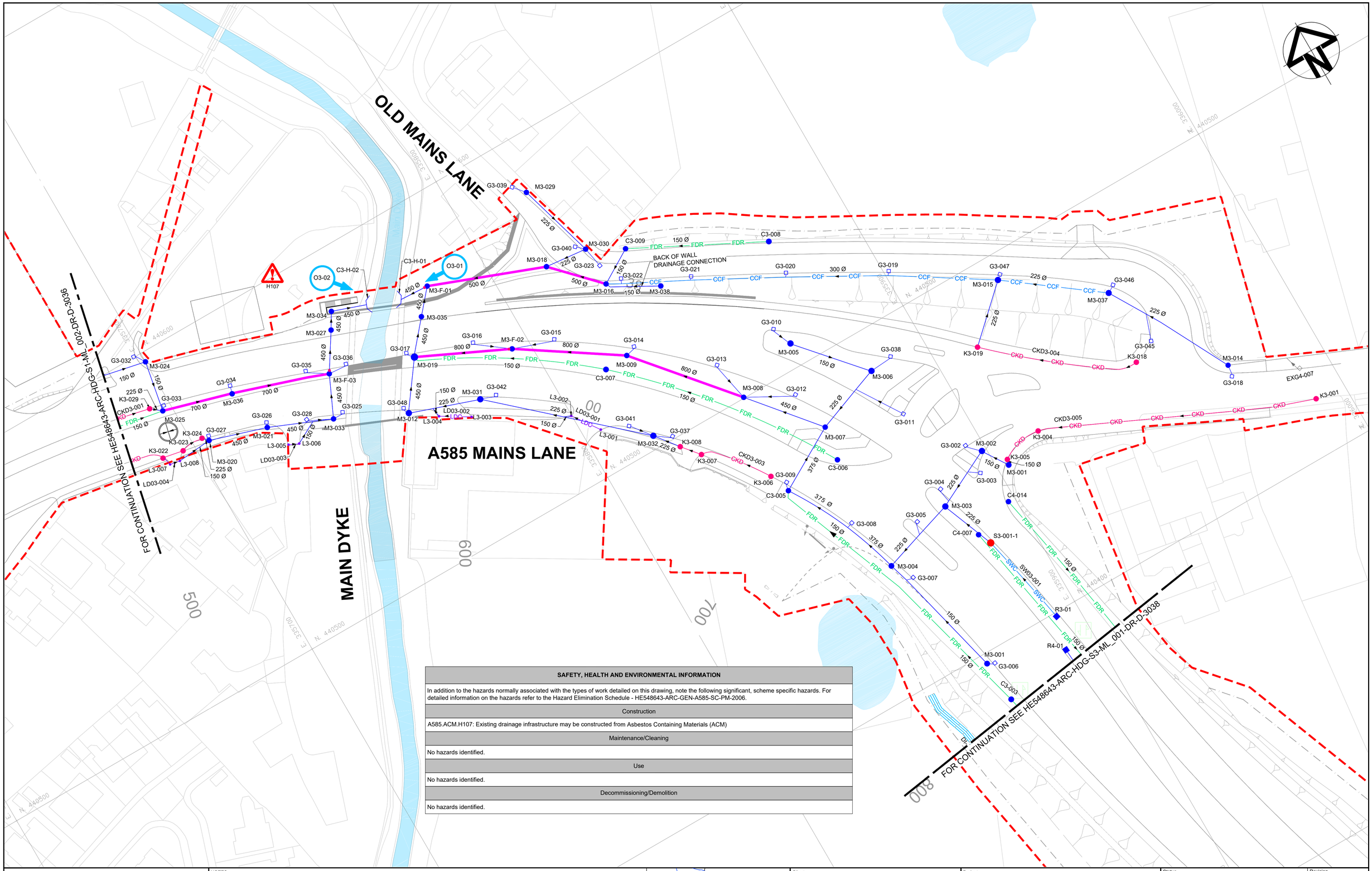
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S1-ML_002-DR-D-3036

100mm on Original

Print Date:

File Path:

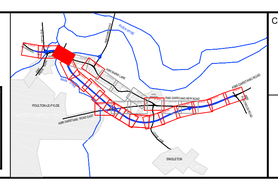


SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN_000-DR-D-3032



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 3 OF 20

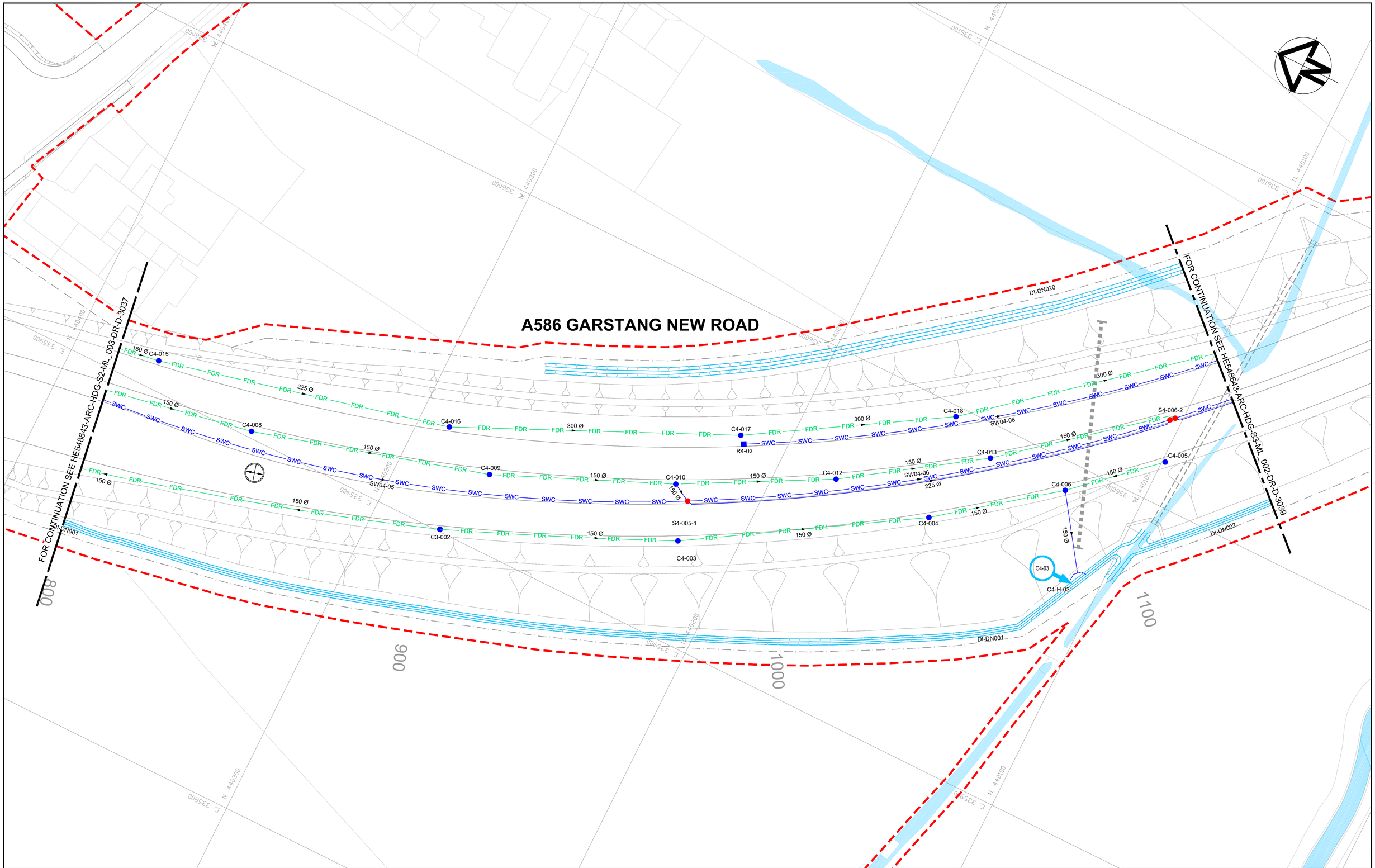
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S2-ML_003-DR-D-3037

100mm on Original

Print Date:

File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN_000-DR-D-3032

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 4 OF 20

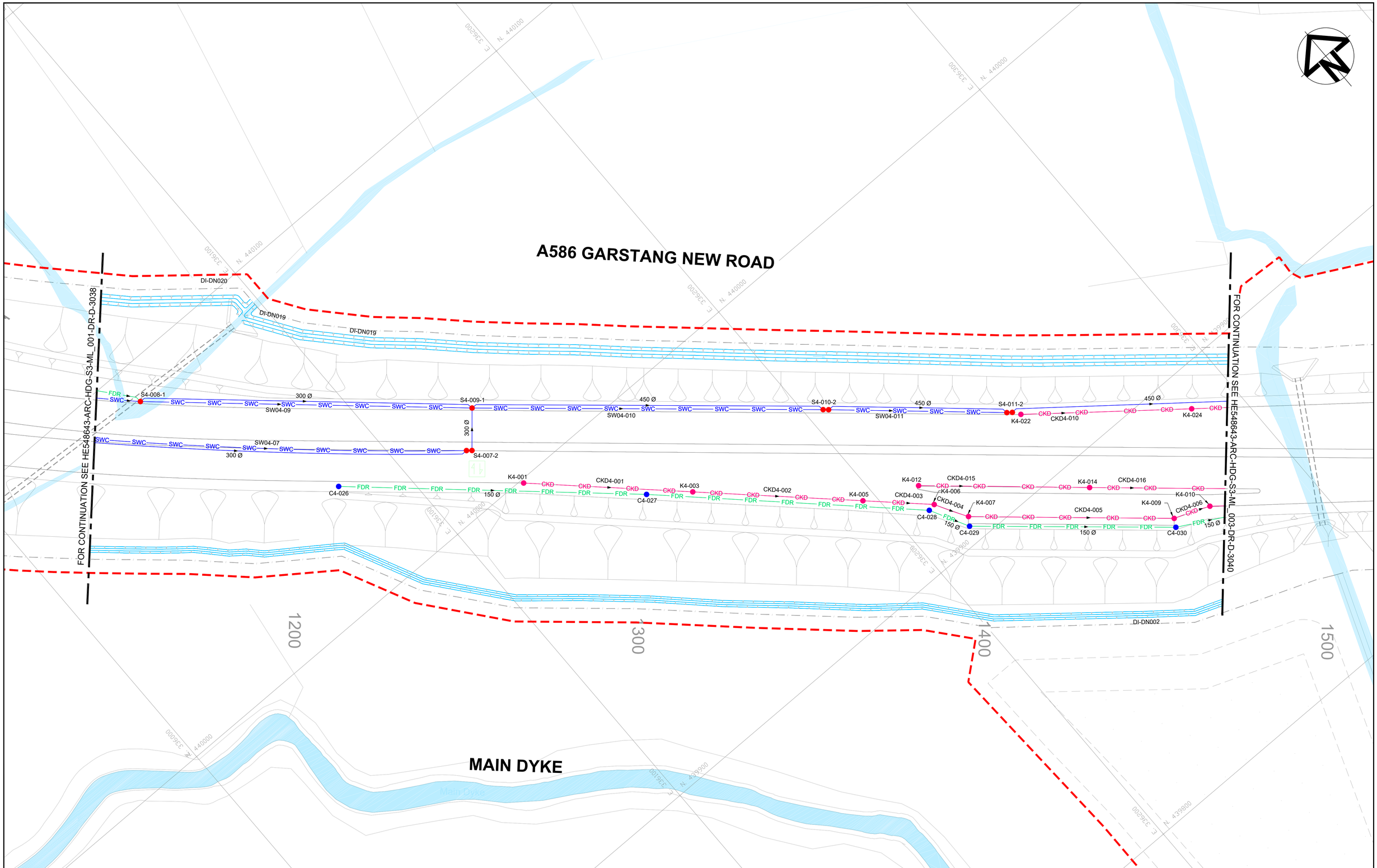
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-HDG-S3-ML_001-DR-D-3038

100mm on Original

Print Date: 2018-07-14 01:37:30

File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\PROPOSED\P03\HE548643-ARC-HDG-SZ-GN000-DR-D-3035-3055.dwg



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 5 OF 20

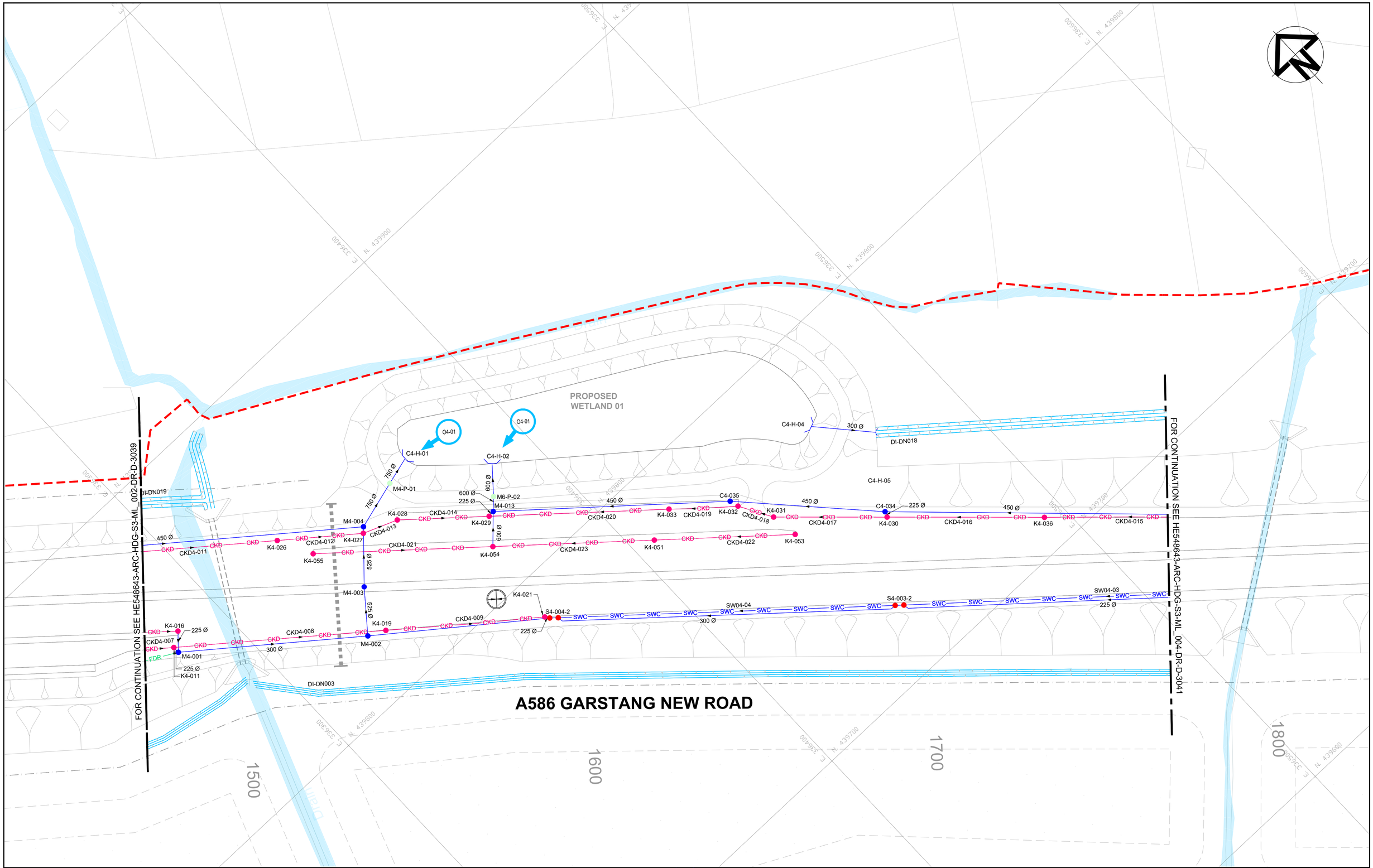
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S3-ML_002-DR-D-3039

100mm on Original

Print Date:

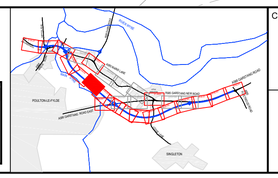
File Path:



P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH
Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 6 OF 20

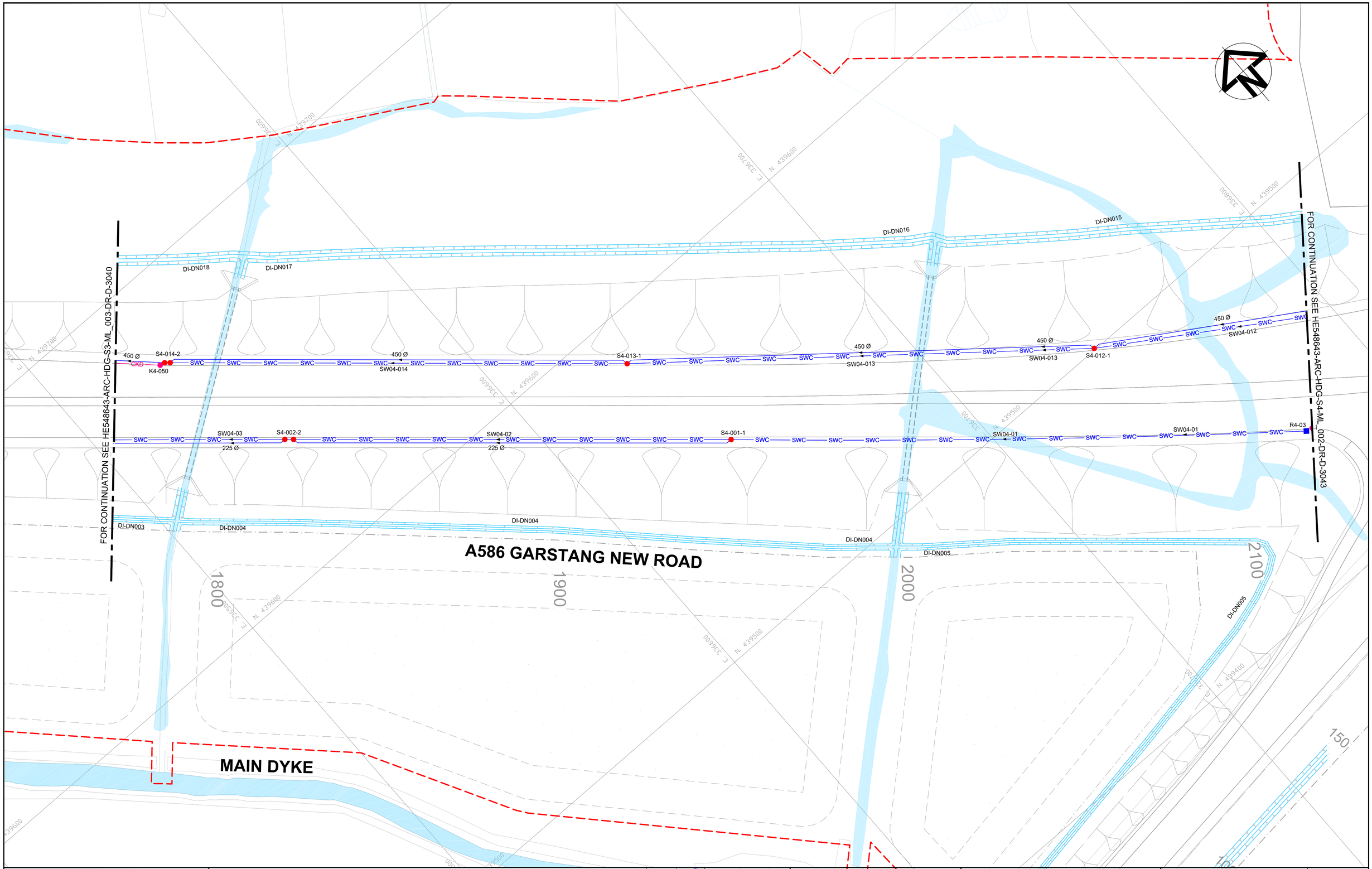
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S3-ML_003-DR-D-3040 (HE PIN | Originator | Volume | Location | Type | Role | Number)

100mm on Original

Print Date:

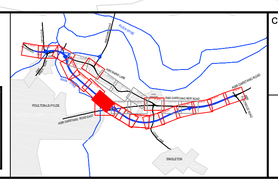
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 7 OF 20

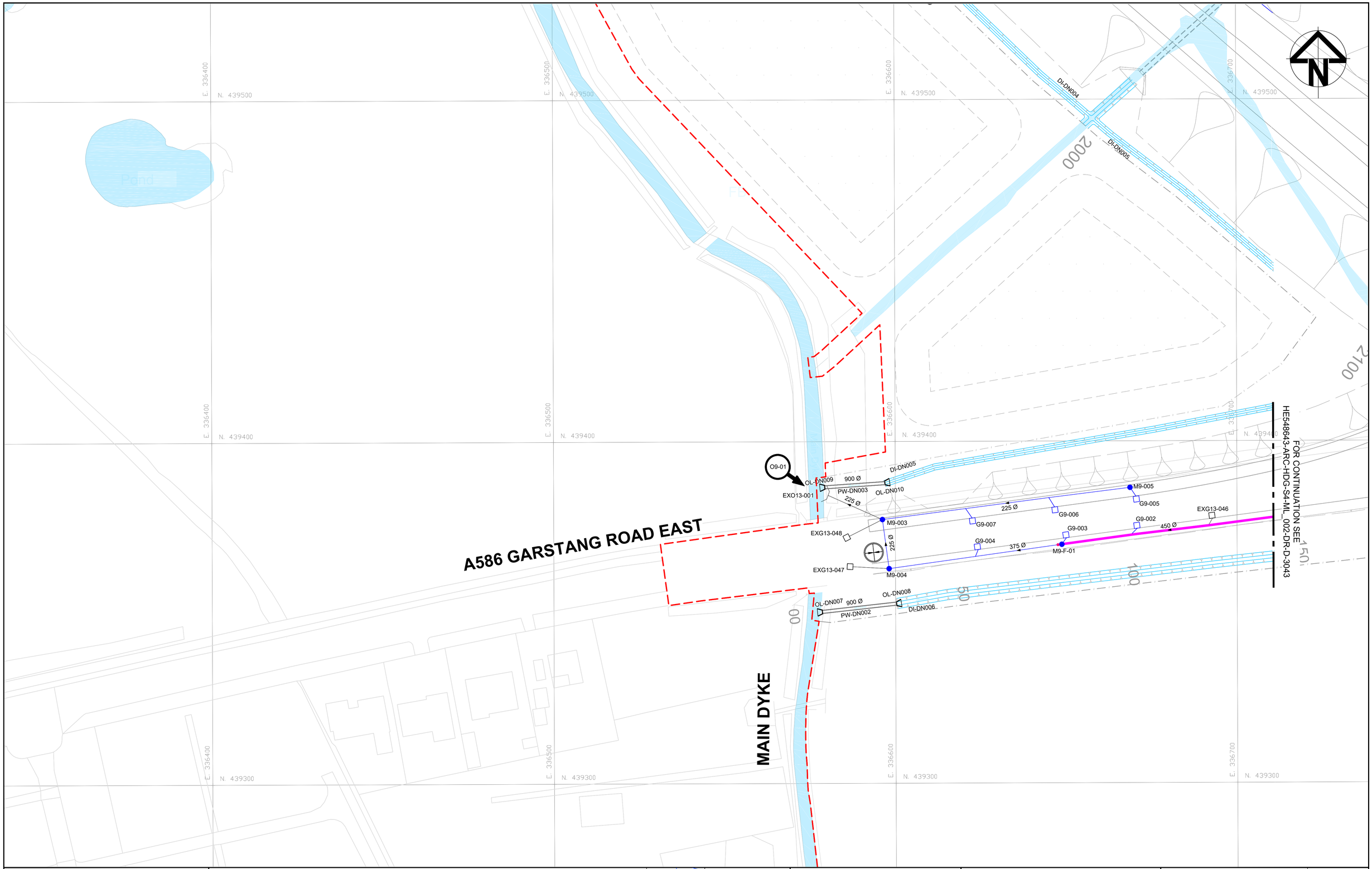
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S3-ML_004-DR-D-3041

100mm on Original

Print Date:

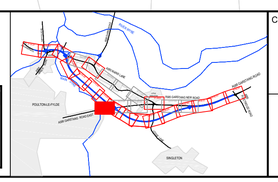
File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 8 OF 20

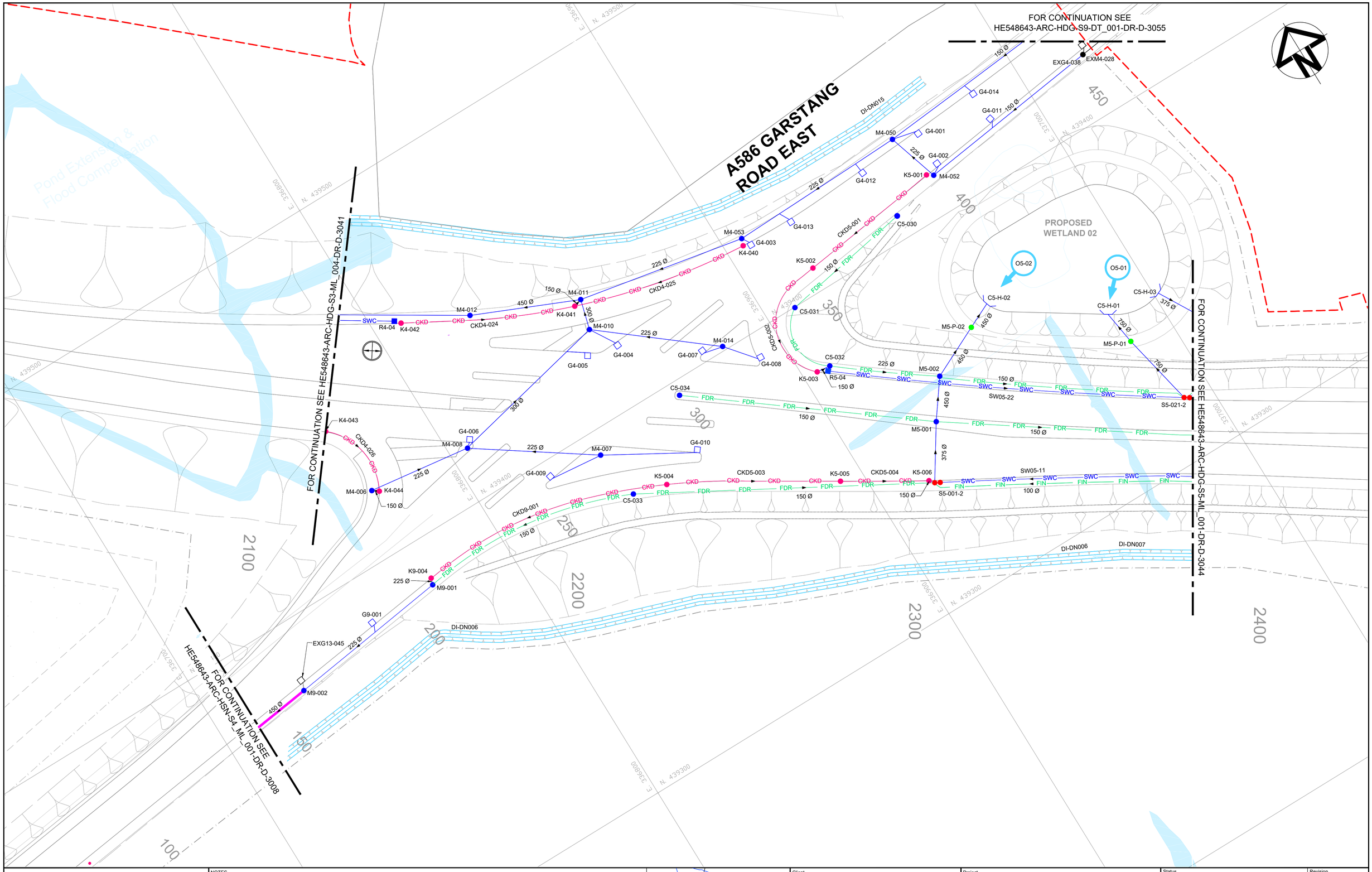
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S4-ML_001-DR-D-3042

100mm on Original

Print Date:

File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 9 OF 20

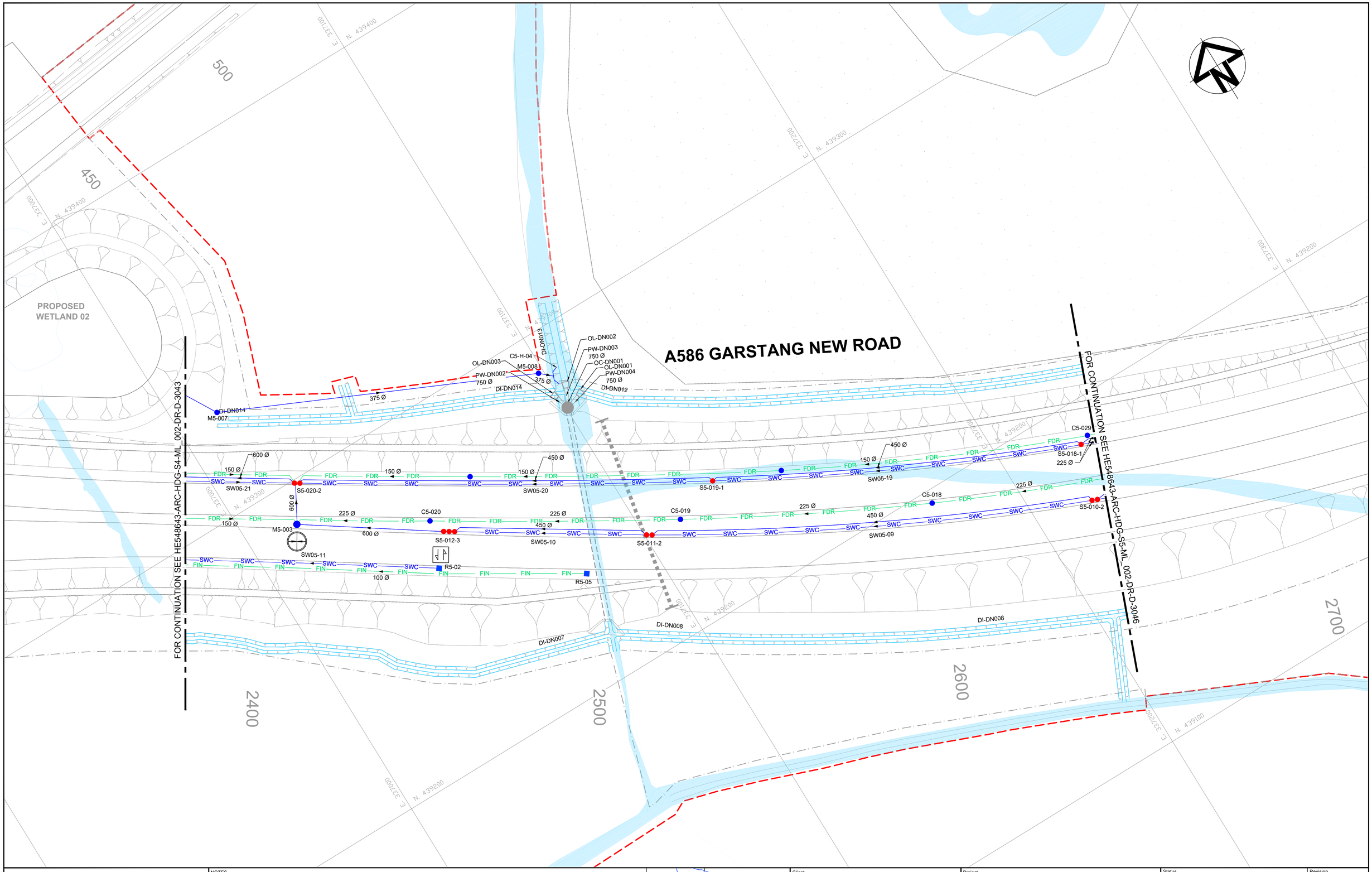
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S4-ML_002-DR-D-3043

100mm on Original

Print Date:

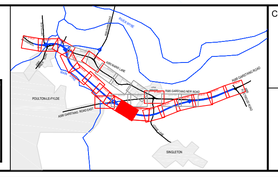
File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 10 OF 20

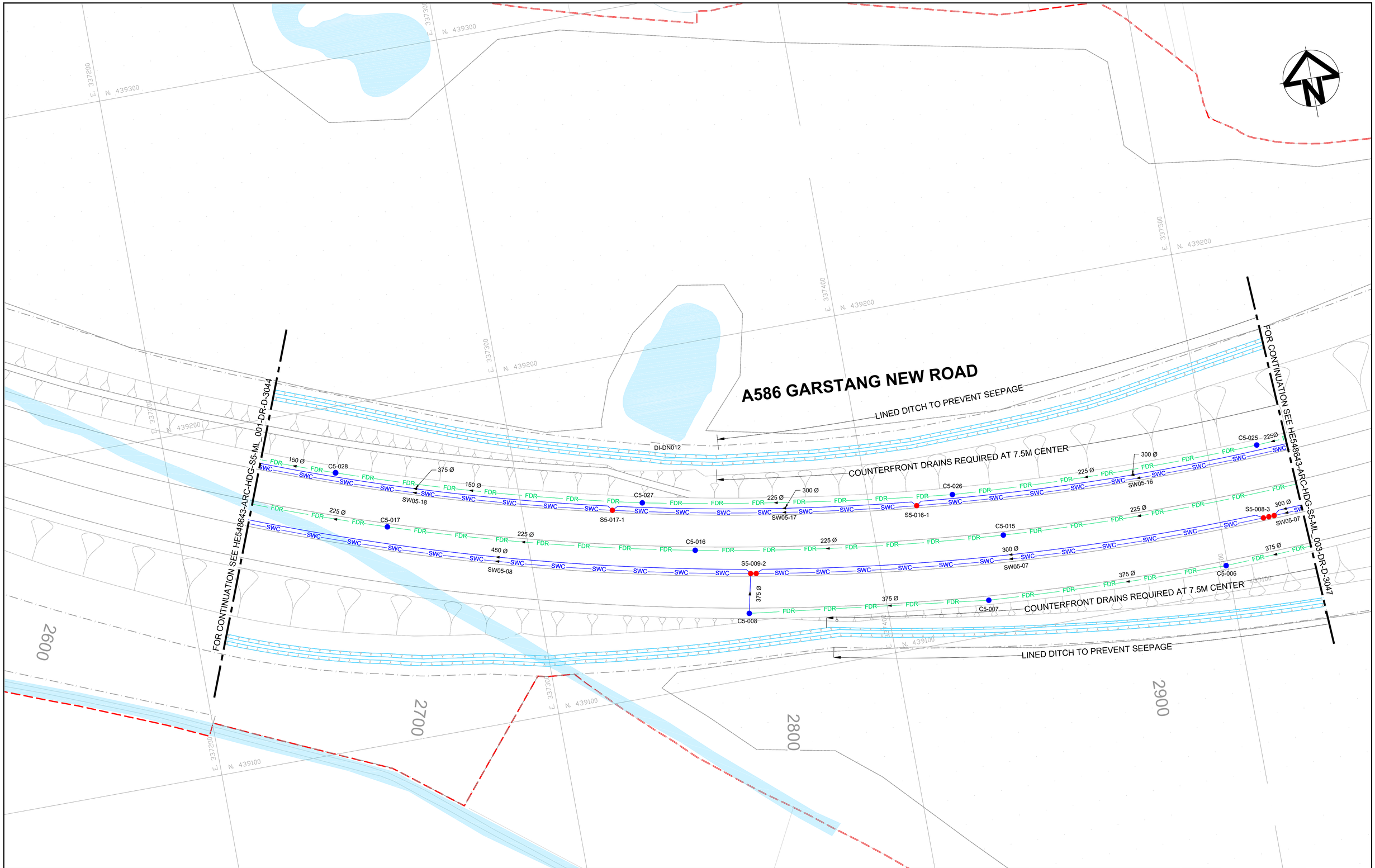
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S5-ML_001-DR-D-3044

100mm on Original

Print Date:

File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 11 OF 20

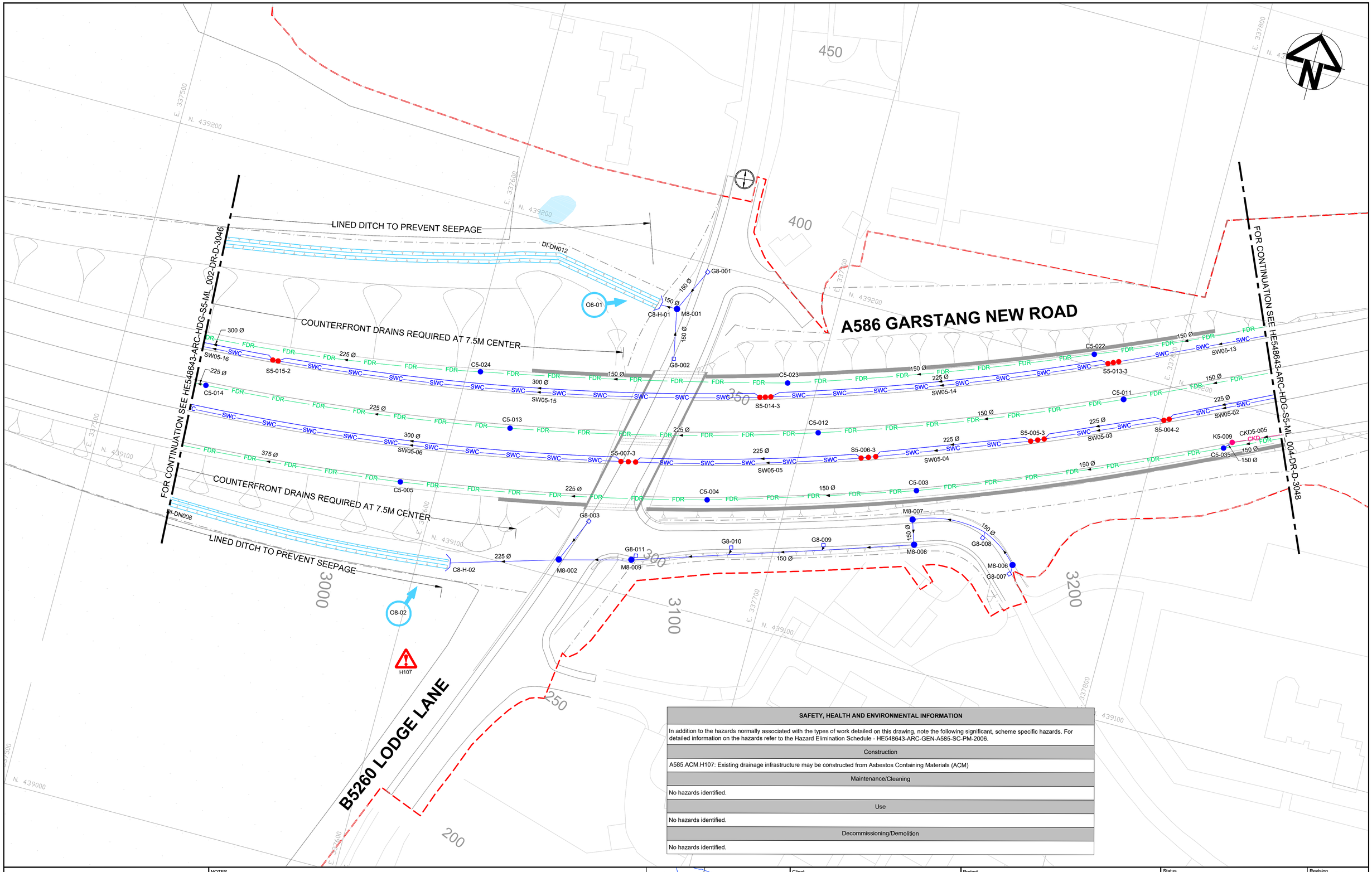
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S5-ML_002-DR-D-3046

100mm on Original

Print Date:

File Path:

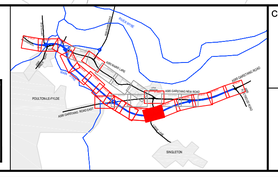


SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 12 OF 20

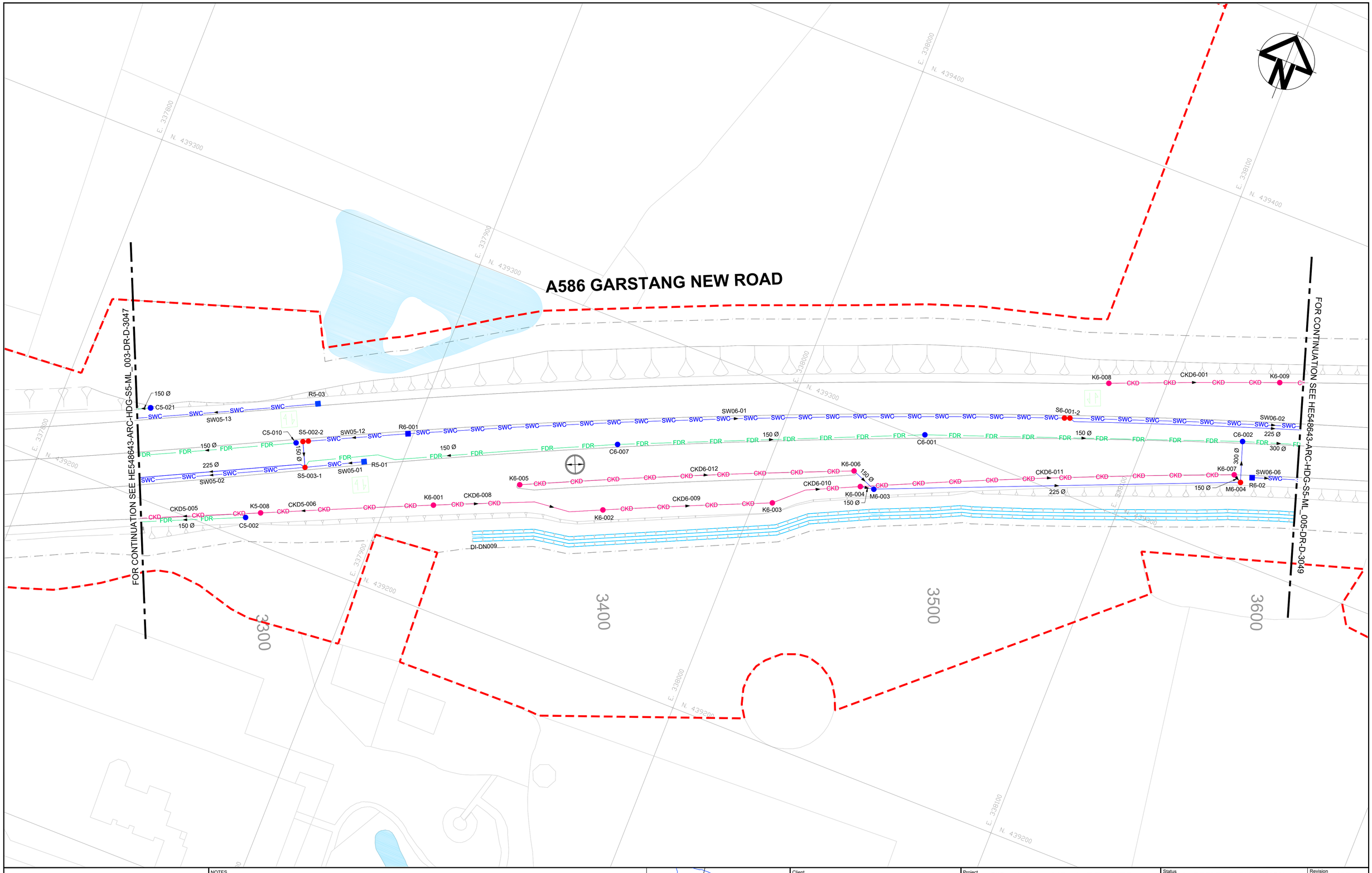
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S5-ML_003-DR-D-3047

100mm on Original

Print Date:

File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

100mm on Original

Print Date:

File Path:

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 13 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-HDG-S5-ML_004-DR-D-3048

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

H107

A585 GARSTANG NEW ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-S5-ML_004-DR-D-3048

FOR CONTINUATION SEE HE548643-ARC-HDG-S6-ML_001-DR-D-3050

3600 3700 3800 3900

E. 338100 E. 338200 E. 338300 E. 338400 E. 338500

N. 439400 N. 439500 N. 439300

K6-010 K6-011 K6-012 K6-013 K6-014 K6-015 K6-016

CKD6-002 CKD6-003 CKD6-004 CKD6-005 CKD6-006 CKD6-007

M6-001 M6-002

150 Ø 225 Ø

EXM10-010 EXM10-012 EXM10-01 EXM10-02 EXG10-03 EXG10-01 EXG10-04 EXG10-02

CDR 150 Ø

SW06-02 SW06-03 SW06-04 SW06-05 SW06-06 SW06-07 SW06-08

S6-002-3 S6-003-2 S6-004-2 S6-006-2 S6-007-2

C6-003 C6-004 C6-005 C6-006

225 Ø 300 Ø 375 Ø

SWC FDR

DL-DN009 DI-DN009

OL-DN004 OL-DN005

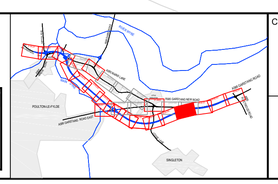
900 Ø

PW-DN001

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 14 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-S5-ML_005-DR-D-3049

100mm on Original

Print Date:

File Path:

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

A585 GARSTANG NEW ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-S5-ML_005-DR-D-3049

FOR CONTINUATION SEE HE548643-ARC-HDG-S6-ML_002-DR-D-3051

H107

EXM10-14

EXG10-005

EXG10-006

K7-001

K7-002

K7-003

K7-004

K7-005

K7-007

CKD7-001

CKD7-002

CKD7-003

C7-001

C7-002

C7-003

SW06-05

SW06-08

SW07-01

SW07-02

S6-005-3

S6-008-2

S7-001-3

C6-005

R7-01

M6-P-01

O6-01

C6-H-01

C6-H-02

C6-H-03

PROPOSED WETLAND 03

DI-DN009

DI-DN010

4000

4100

4200

4300

E. 338600 N. 439500

E. 338700 N. 439500

E. 338800 N. 439500

E. 338500 N. 439400

E. 338600 N. 439400

E. 338700 N. 439400

E. 338800 N. 439400

E. 338500 N. 439300

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

100mm on Original

Print Date:

File Path:

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 15 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-HDG-S6-ML_001-DR-D-3050

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.UG.H91Constraint: Existing large drainage and hydrobrake
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

A585 GARSTANG NEW ROAD

H91

H107

O11A

EXO11A 375 Ø

EXM11-105 750 Ø

EXM11-140

EXM11-093 750 Ø

EXM11-090 750 Ø

EXM11-087 750 Ø

EXG11-088

EXG11-086

EXG11-089

K7-008

K7-009

K7-010

K7-011

K7-012

CKD7-004

CKD7-005

CKD

C7-004

C7-007

C7-008

C7-009

C7-010

150 Ø

FDR

M7-001 225 Ø

M7-P-01 450 Ø

S7-002-2

S7-003-1

S7-004-2

S7-005-2

SW07-02 300 Ø

SW07-03 450 Ø

SW07-04

SW07-05 300 Ø

SWC

C7-H-01

C7-H-02

C7-H-03

O7-01

PROPOSED WETLAND 04

DI-DN010

DI-DN011

DI-DN01T

FOR CONTINUATION SEE HE548643-ARC-HDG-S6-ML_001-DR-D-3050

FOR CONTINUATION SEE HE548643-ARC-HDG-S6-ML_003-DR-D-3052

4300

4400

4500

4600

Pond

Drain

E. 339800 N. 439600

E. 339900 N. 439600

E. 339100 N. 439700

E. 339100 N. 439500

E. 339900 N. 439500

E. 339800 N. 439400

E. 339200

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 16 OF 20

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

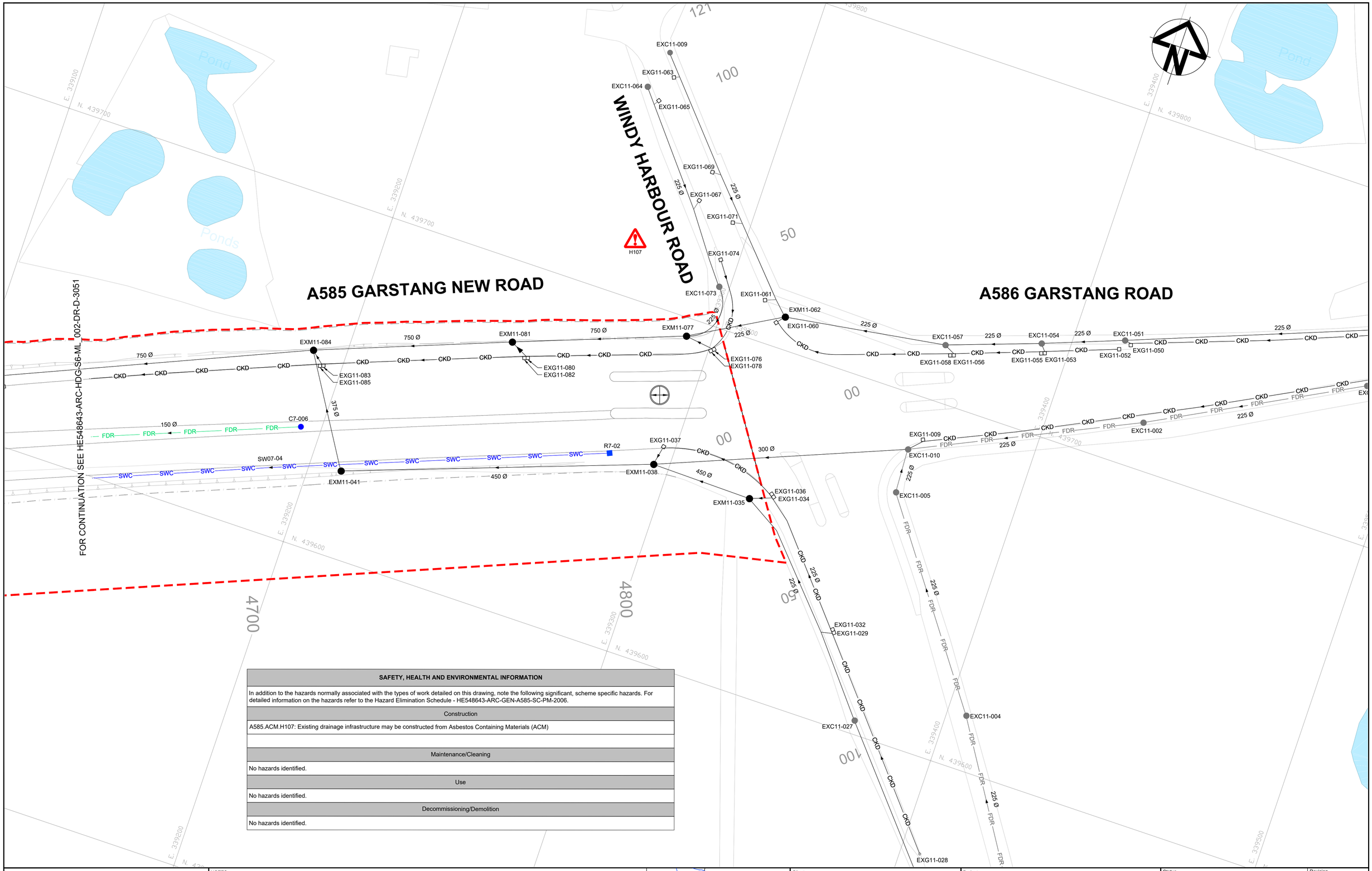
Drawing number HE | PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-S6-ML_002-DR-D-3051

100mm on Original

Print Date:

File Path:



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the hazards normally associated with the types of work detailed on this drawing, note the following significant, scheme specific hazards. For detailed information on the hazards refer to the Hazard Elimination Schedule - HE548643-ARC-GEN-A585-SC-PM-2006.
Construction
A585.ACM.H107: Existing drainage infrastructure may be constructed from Asbestos Containing Materials (ACM)
Maintenance/Cleaning
No hazards identified.
Use
No hazards identified.
Decommissioning/Demolition
No hazards identified.

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
The Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel: 44 (0)1483 603 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 17 OF 20

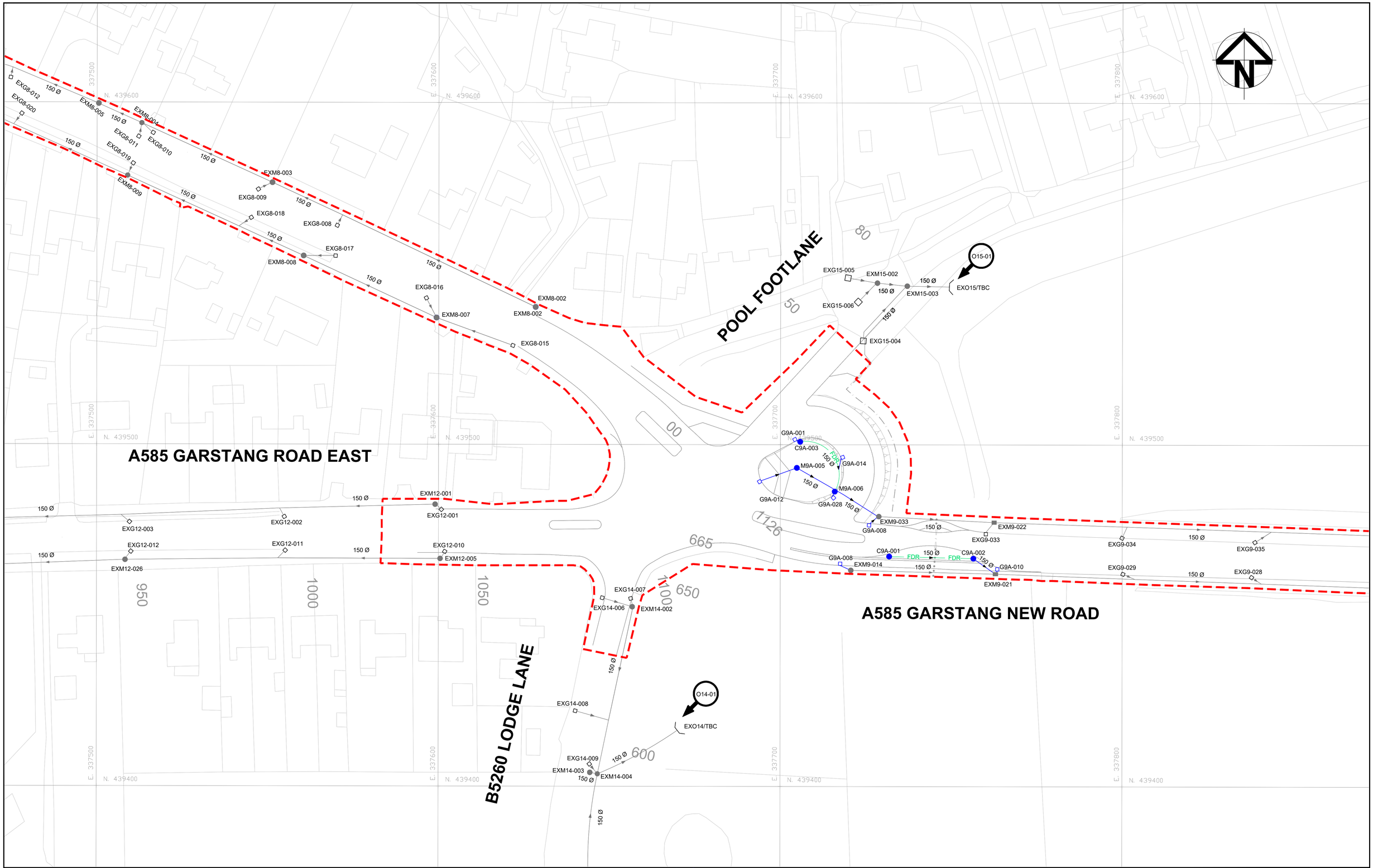
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S6-ML_003-DR-D-3052

100mm on Original

Print Date:

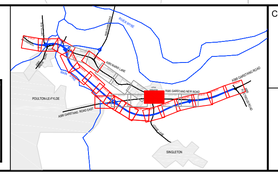
File Path:



Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 18 OF 20

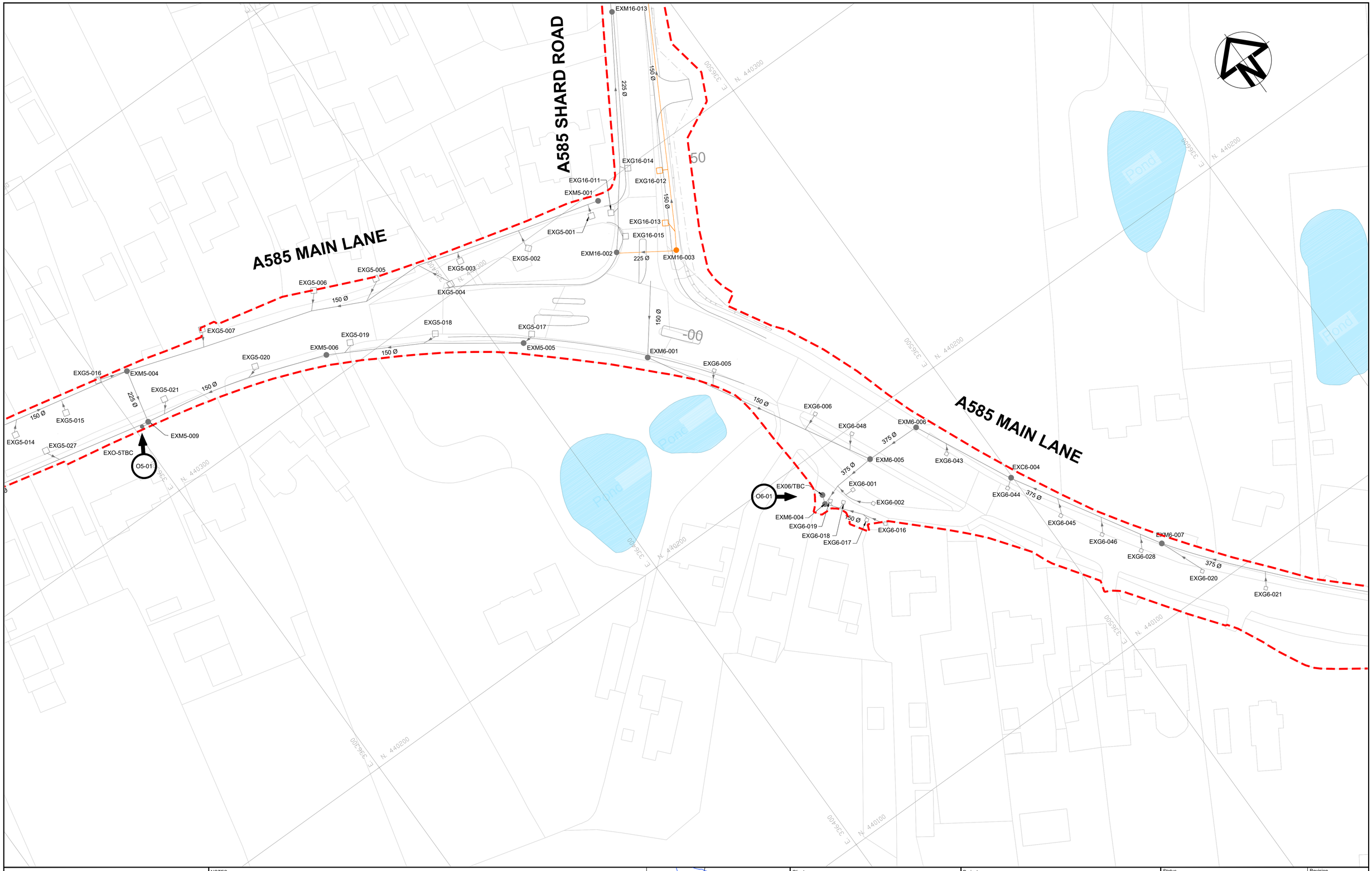
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S7-JN_001-DR-D-3053

100mm on Original

Print Date:

File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3032

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	22DEC2017	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 19 OF 20

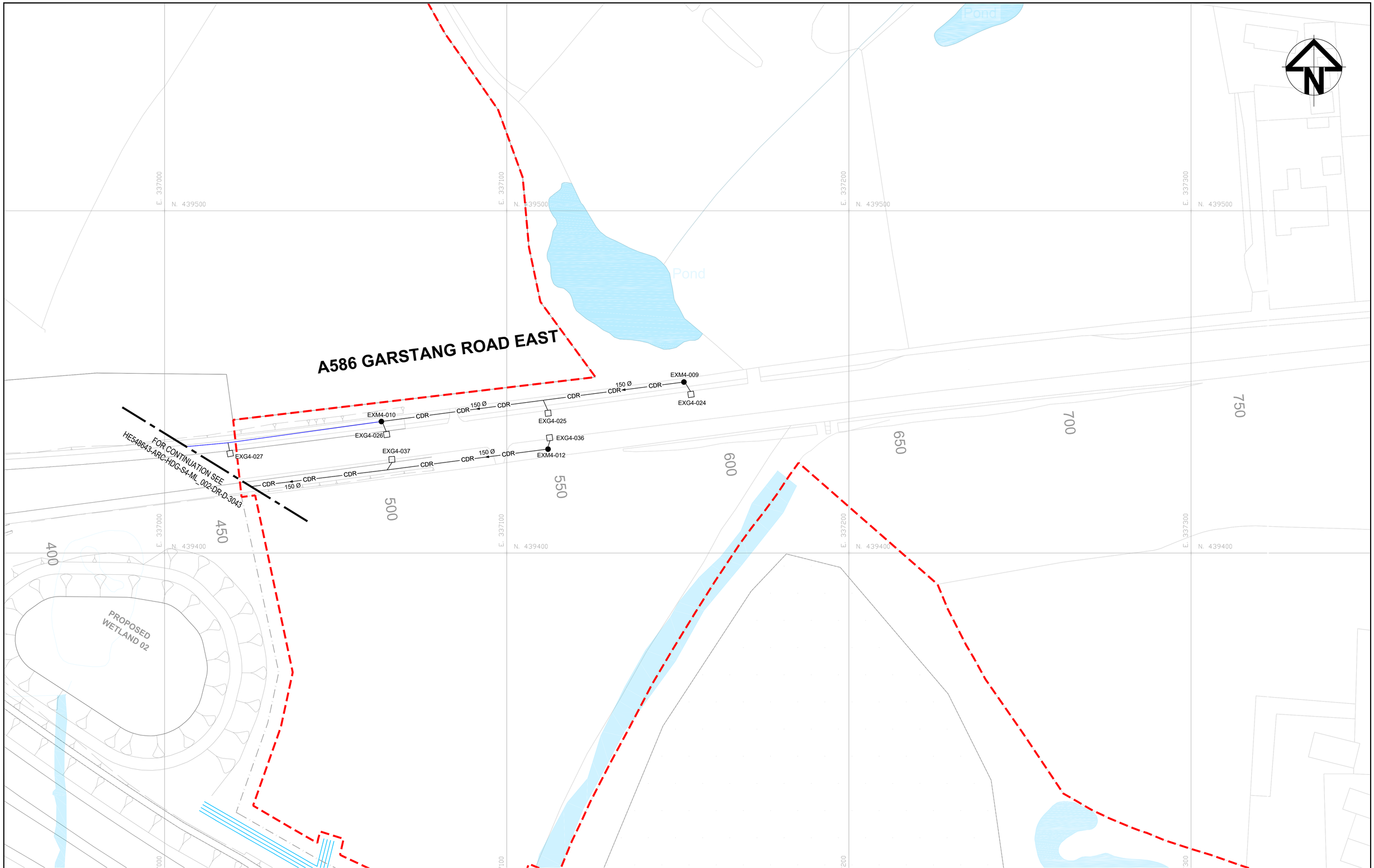
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-S8-DT_002-DR-D-3054

100mm on Original

Print Date:

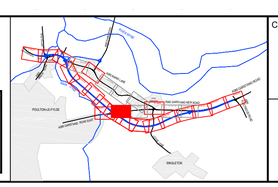
File Path:



NOTES

1. FOR NOTES AND LEGENDS REFER DRAWING NO : HE548643-ARC-HDG-SZ-GN000-DR-D-3072

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	S3	21FEB2018	PRELIMINARY DESIGN	SK	AC	NH



Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED DRAINAGE PLAN SHEET 20 OF 20

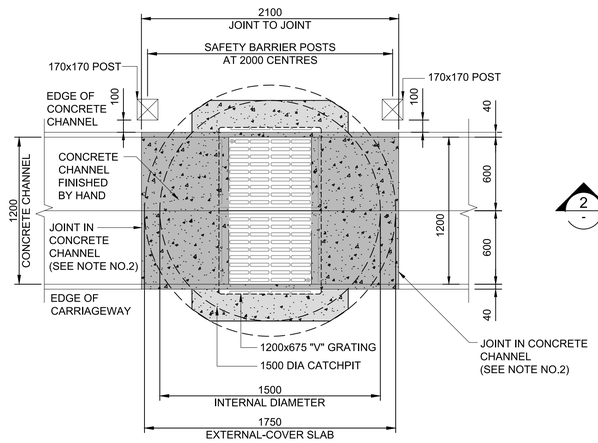
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number: HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-S9-DT_001-DR-D-3055

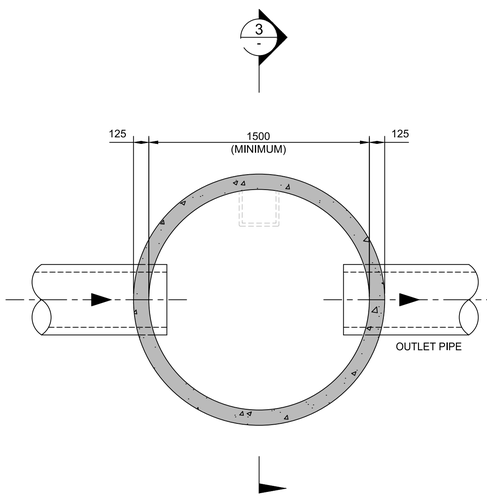
100mm on Original

Print Date:

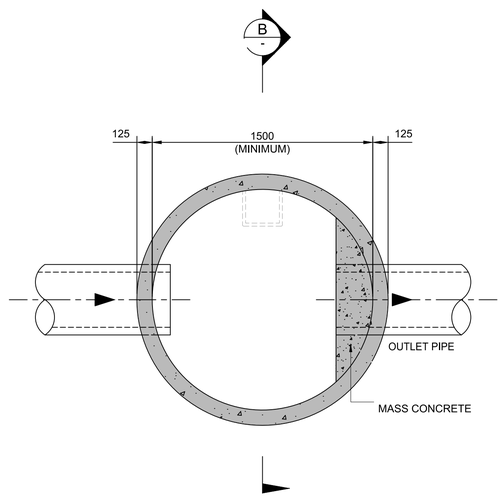
File Path:



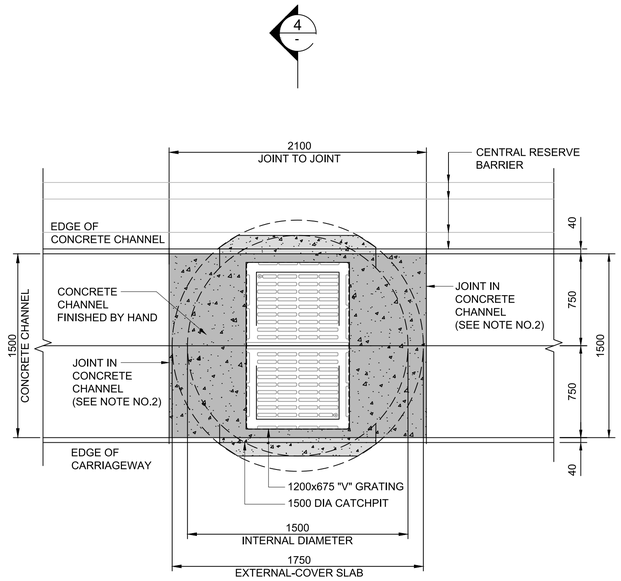
PLAN AT COVER LEVEL
1200 WIDE CHANNEL - VERGE



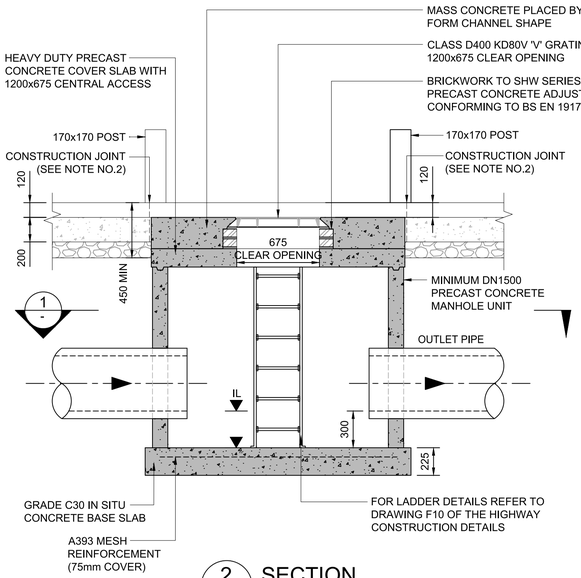
1 SECTION
-



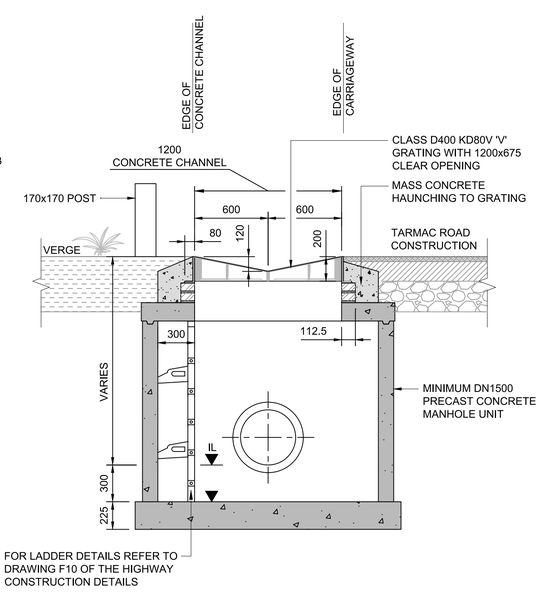
A SECTION
-



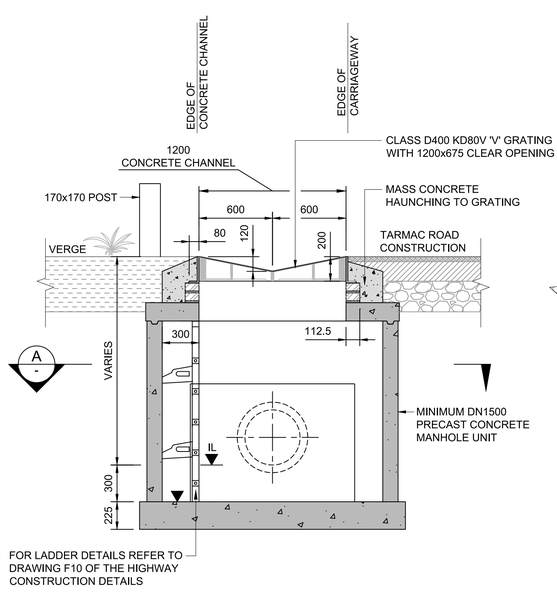
PLAN AT COVER LEVEL
1500 WIDE CHANNEL
CENTRAL RESERVE



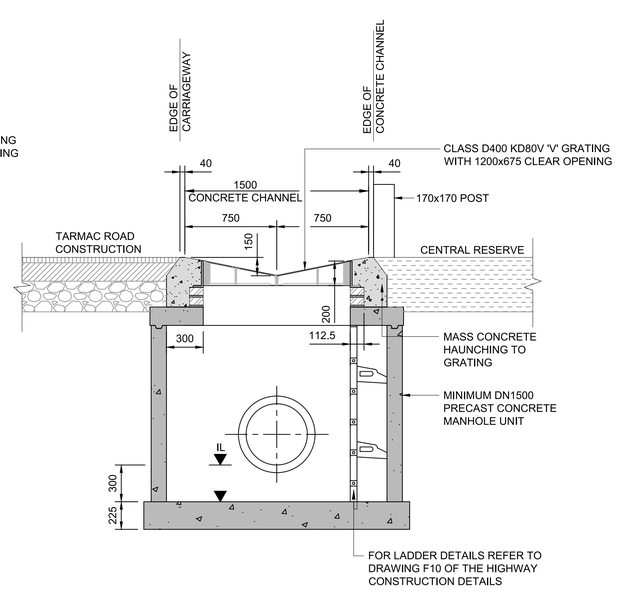
2 SECTION
-



3 SECTION
-



B SECTION
-



4 SECTION
-

NOTES

1. SAFETY CHAINS REQUIRED WHERE OUTLET PIPE IS 600 DIA OR GREATER.
2. CONSTRUCTION JOINT (TRANSVERSE JOINT) BETWEEN THE SLIP FORMED STORM WATER CHANNEL AND HAND-LAID SECTION (APRON SLAB) SHALL BE IN ACCORDANCE WITH THE HIGHWAY CONSTRUCTION DRAWINGS (HCD's), F SERIES DRAWINGS, DRAWING F22, NOTE 6.
3. THE DETAIL TO BE READ IN CONJUNCTION WITH PROPOSED DRAINAGE PLANS (HE548643-ARC-HDG-A585-DR-D-3324-3342).
4. ALL DIMENSIONS ARE IN MILIMETRES UNLESS SPECIFIED.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: SURFACE WATER CHANNEL DETAILS 1 PAIR INTERMEDIATE

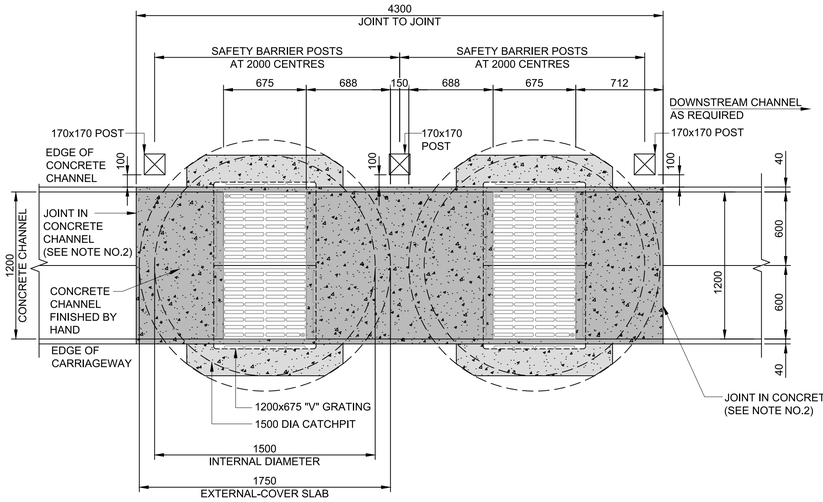
Status	S3-PRELIMINARY DESIGN	Revision P02
Scale	NTS	Date 10JUL2018
Drawn By	S. KHANDRE	
Checked By	A. COPE	
Approved By	N. HENDERSON	
		Original Size A1

Drawing number: HE548643-ARC-HDG-SZ-GN_000-DE-D-3056

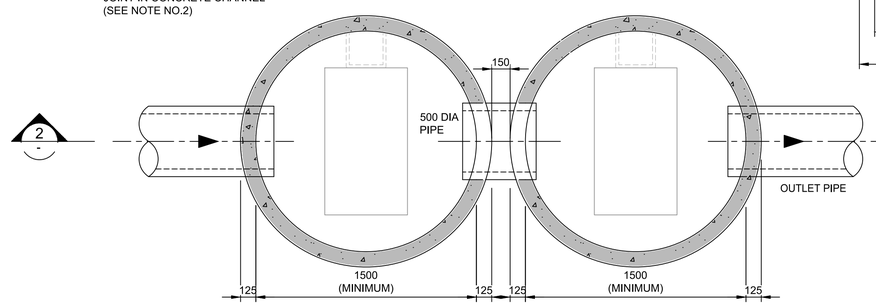
100mm on Original

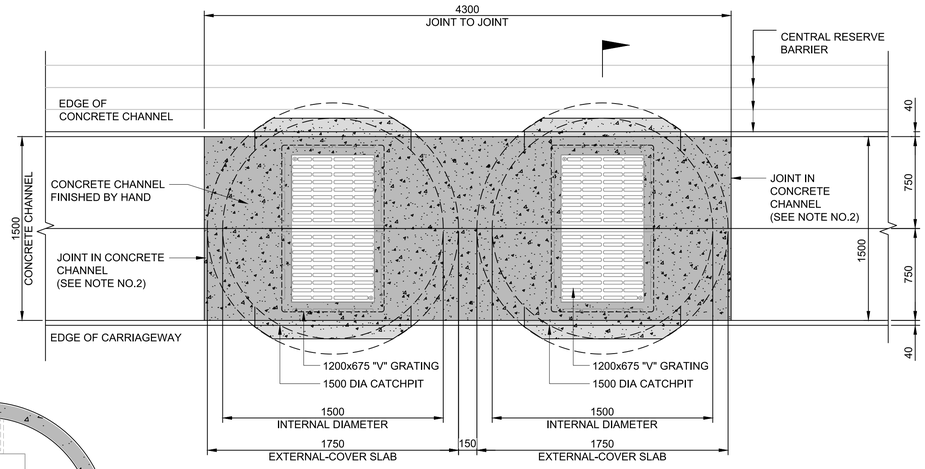
Print Date: 2018-07-13 15:42:56

File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3056-3061.dwg



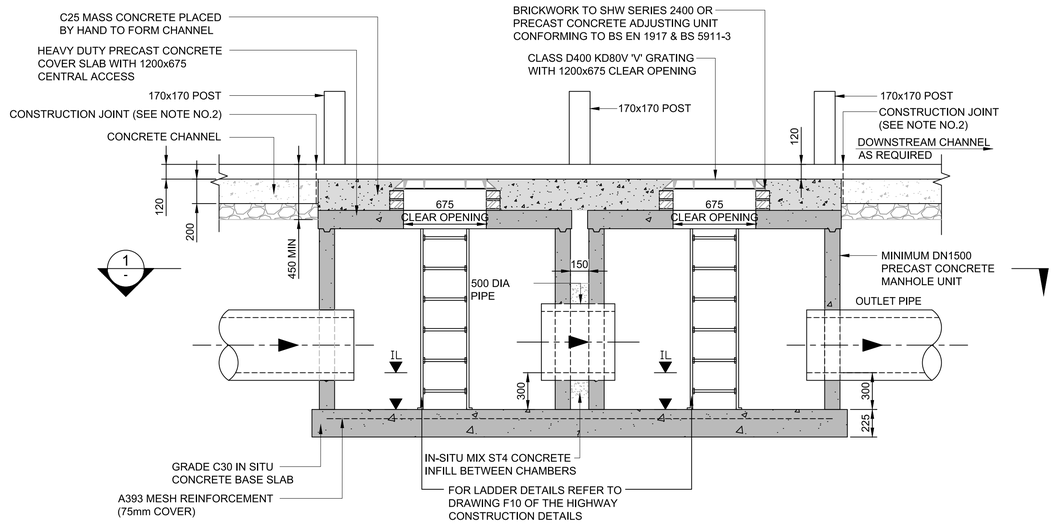
PLAN AT COVER LEVEL
1200 WIDE CHANNEL - VERGE



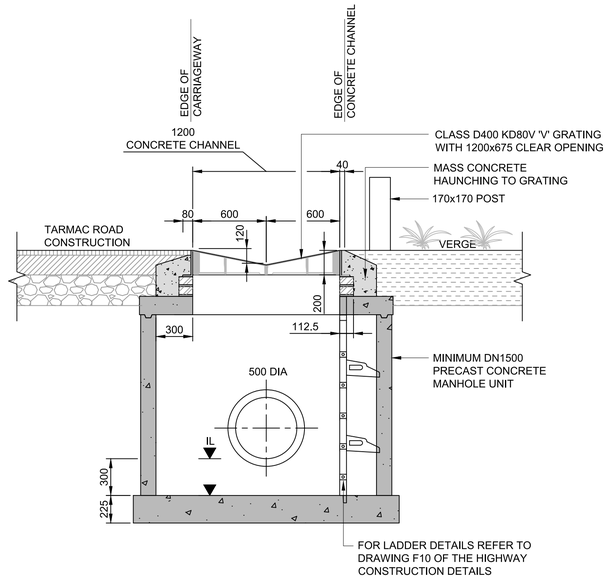


PLAN AT COVER LEVEL
1500 WIDE CHANNEL
CENTRAL RESERVE

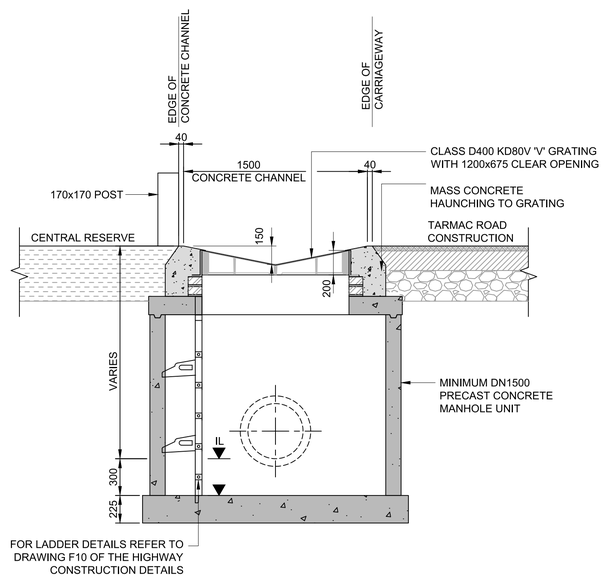
1 SECTION



2 SECTION



3 SECTION



4 SECTION

NOTES

1. SAFETY CHAINS REQUIRED WHERE OUTLET PIPE IS 600 DIA OR GREATER.
2. CONSTRUCTION JOINT (TRANSVERSE JOINT) BETWEEN THE SLIP FORMED STORM WATER CHANNEL AND HAND-LAID SECTION (APRON SLAB) SHALL BE IN ACCORDANCE WITH THE HIGHWAY CONSTRUCTION DRAWINGS (HCD's), F SERIES DRAWINGS, DRAWING F22, NOTE 6.
3. THE DETAIL TO BE READ IN CONJUNCTION WITH PROPOSED DRAINAGE PLANS (HE548643-ARC-HDG-A585-DR-D-3324-3342).
4. ALL DIMENSIONS ARE IN MILIMETRES UNLESS SPECIFIED.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: SURFACE WATER CHANNEL DETAILS 2 PAIR INTERMEDIATE

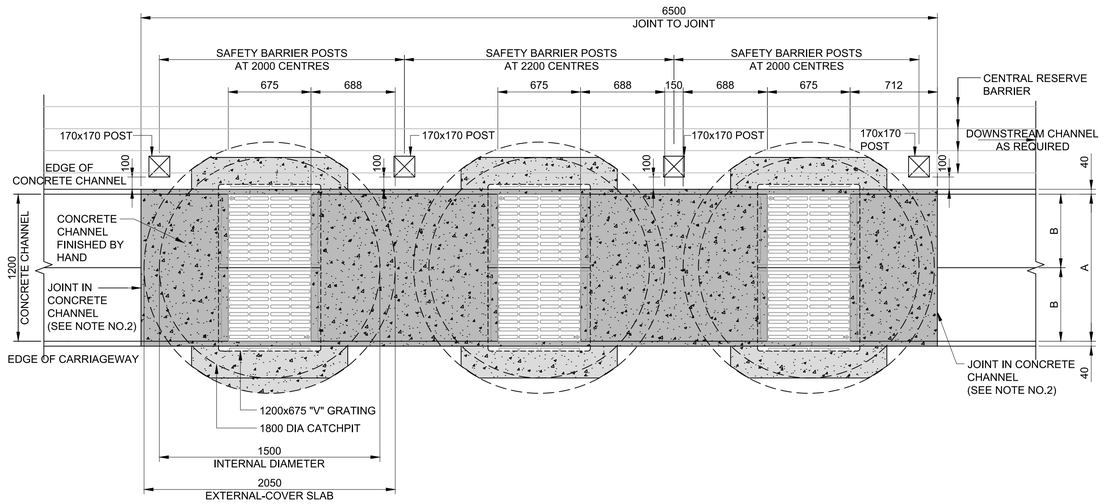
Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	S. KHANDRE
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

Drawing number: HE548643-ARC-HDG-SZ-GN_000-DE-D-3057

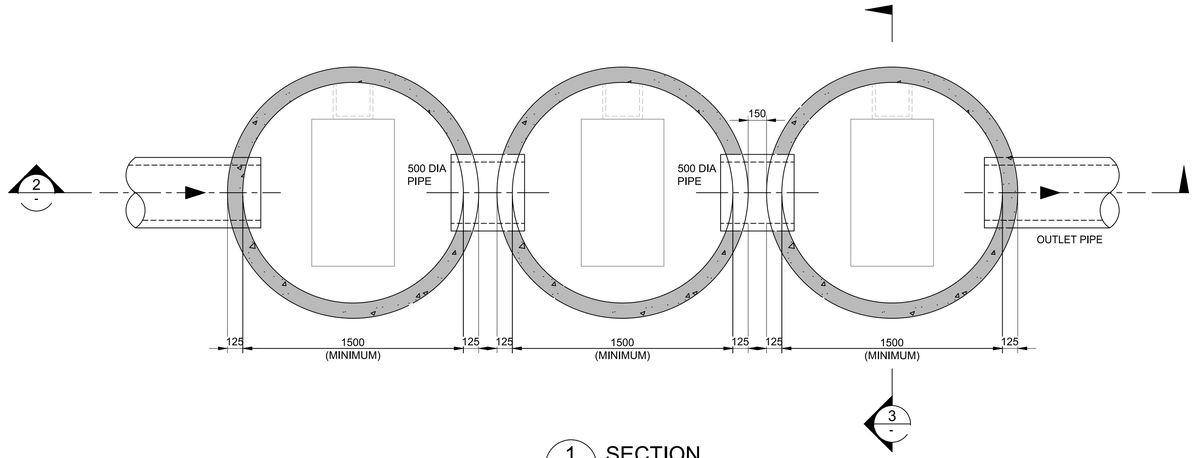
100mm on Original

Print Date: 2018-07-13 15:43:03

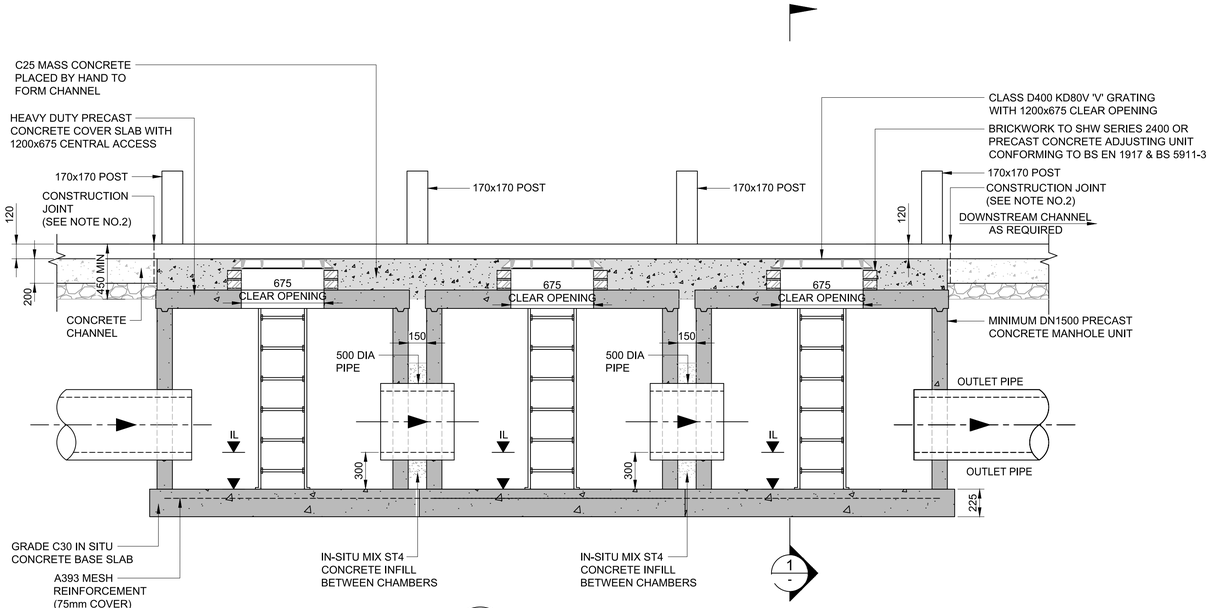
File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3056-3061.dwg



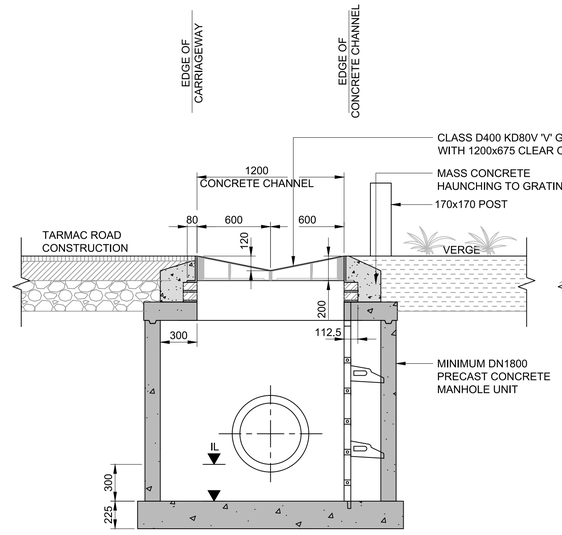
PLAN AT COVER LEVEL



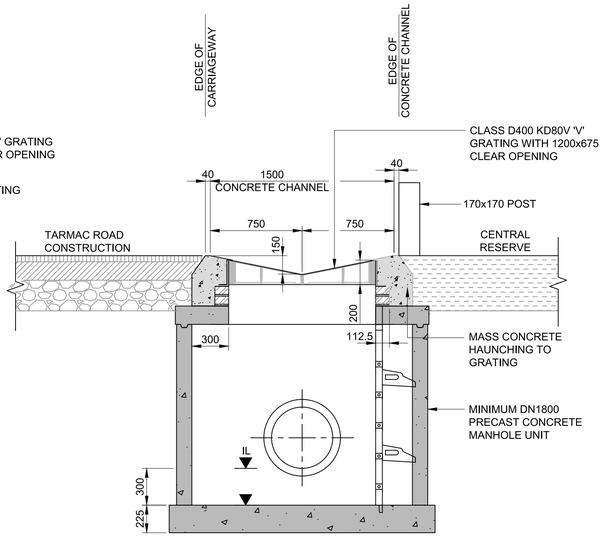
1 - SECTION



2 - SECTION



3 - SECTION



SECTION AT CENTRAL RESERVE

CHANNEL	DIMENSION		LOCATION
	A	B	
1200	1200	600	VERGE
1500	1500	750	CENTRAL RESERVE

NOTES

1. SAFETY CHAINS REQUIRED WHERE OUTLET PIPE IS 600 DIA OR GREATER.
2. CONSTRUCTION JOINT (TRANSVERSE JOINT) BETWEEN THE SLIP FORMED STORM WATER CHANNEL AND HAND-LAID SECTION (APRON SLAB) SHALL BE IN ACCORDANCE WITH THE HIGHWAY CONSTRUCTION DRAWINGS (HCD's), F SERIES DRAWINGS, DRAWING F22, NOTE 6.
3. THE DETAIL TO BE READ IN CONJUNCTION WITH PROPOSED DRAINAGE PLANS (HE548643-ARC-HDG-A585-DR-D-3324-3342).
4. ALL DIMENSIONS ARE IN MILIMETRES UNLESS SPECIFIED.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: SURFACE WATER CHANNEL DETAILS 3 PAIR INTERMEDIATE

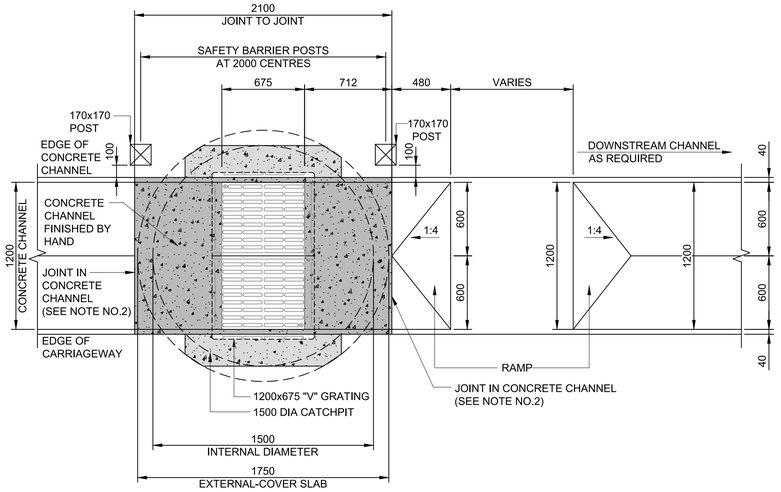
Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	S. KHANDRE
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

Drawing number: HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3058

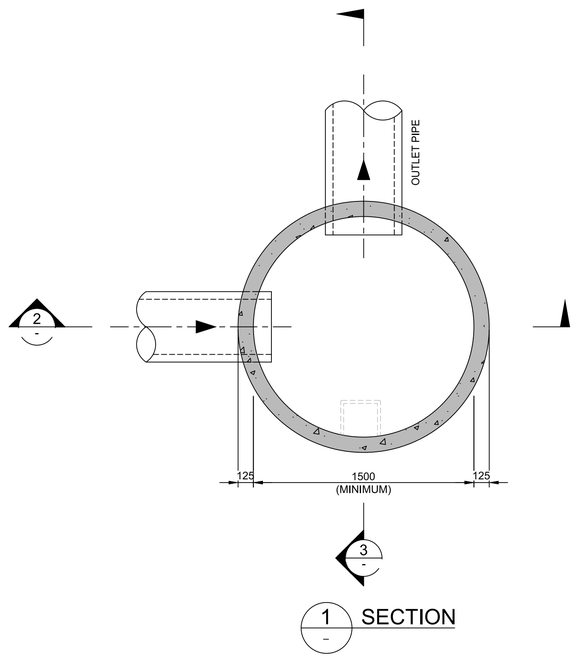
100mm on Original

Print Date: 2018-07-13 15:43:08

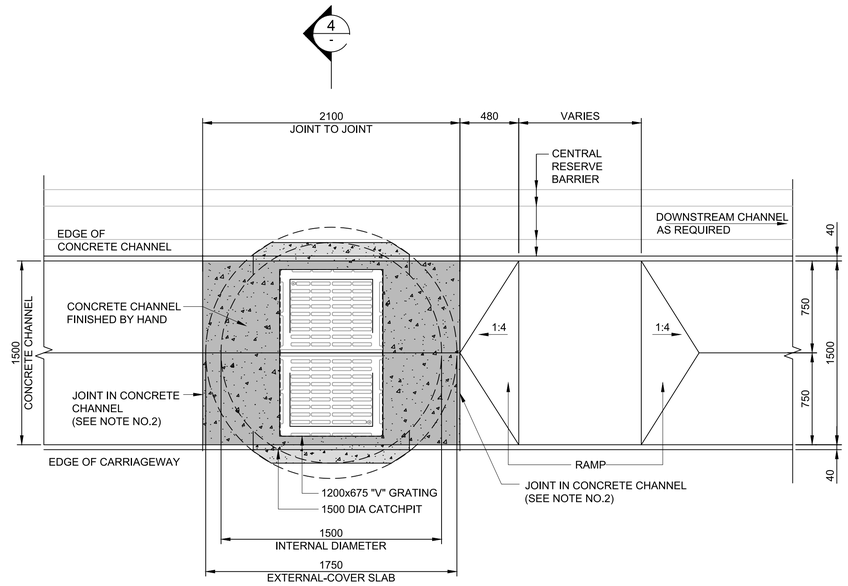
File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3056-3061.dwg



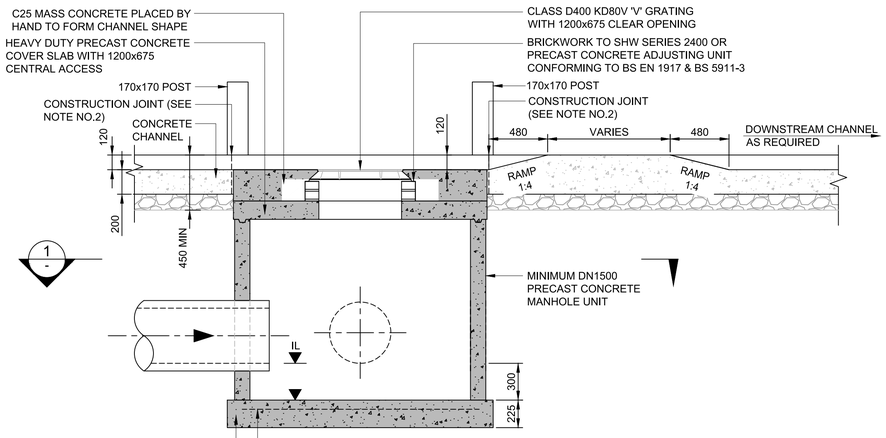
PLAN AT COVER LEVEL
1200 WIDE CHANNEL - VERGE



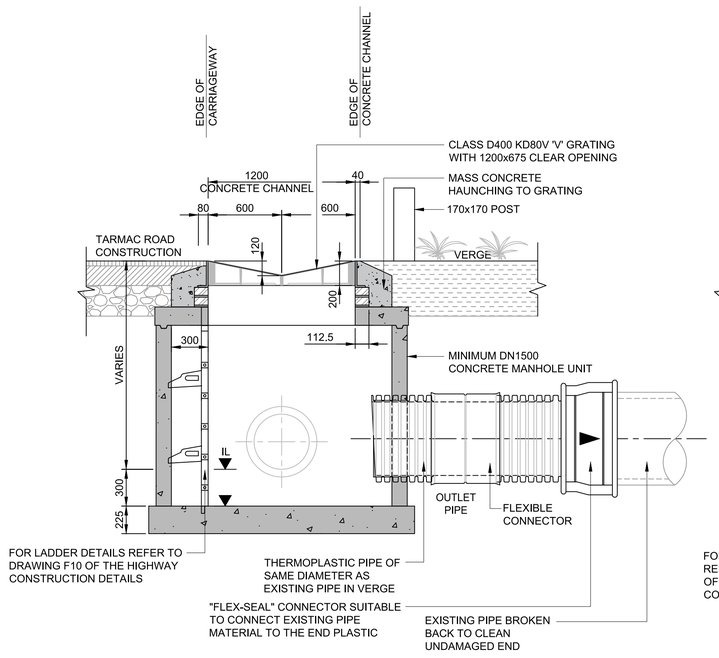
1 SECTION



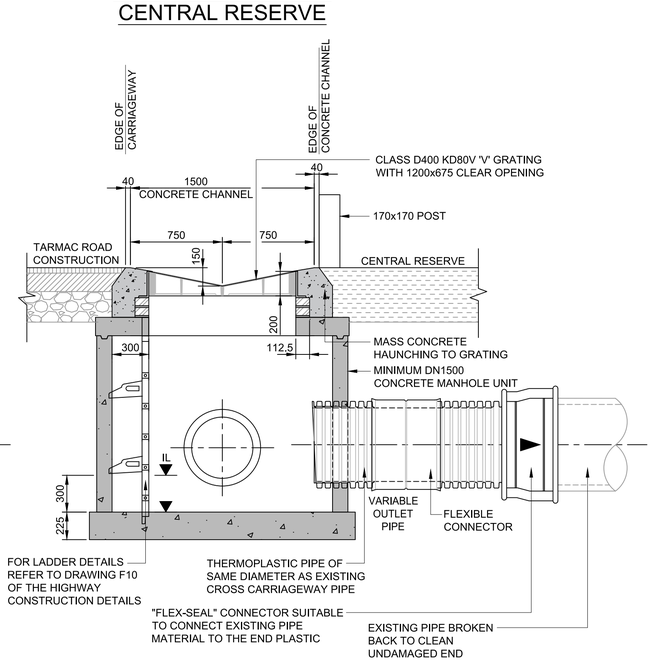
PLAN AT COVER LEVEL
1500 WIDE CHANNEL
CENTRAL RESERVE



2 SECTION



3 SECTION



4 SECTION

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SK	AC	NH

NOTES

1. SAFETY CHAINS REQUIRED WHERE OUTLET PIPE IS 600 DIA OR GREATER.
2. CONSTRUCTION JOINT (TRANSVERSE JOINT) BETWEEN THE SLIP FORMED STORM WATER CHANNEL AND HAND-LAID SECTION (APRON SLAB) SHALL BE IN ACCORDANCE WITH THE HIGHWAY CONSTRUCTION DRAWINGS (HCD's), F SERIES DRAWINGS, DRAWING F22, NOTE 6.
3. THE DETAIL TO BE READ IN CONJUNCTION WITH PROPOSED DRAINAGE PLANS (HE548643-ARC-HDG-A585-DR-D-3324-3342).
4. ALL DIMENSIONS ARE IN MILIMETRES UNLESS SPECIFIED.

Client: highways england

ARCADIS
Registered office:
Arcadis House
34 York Way
London
N1 9AB
Coordinating office:
The Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: SURFACE WATER CHANNEL DETAILS 1 PAIR TERMINAL

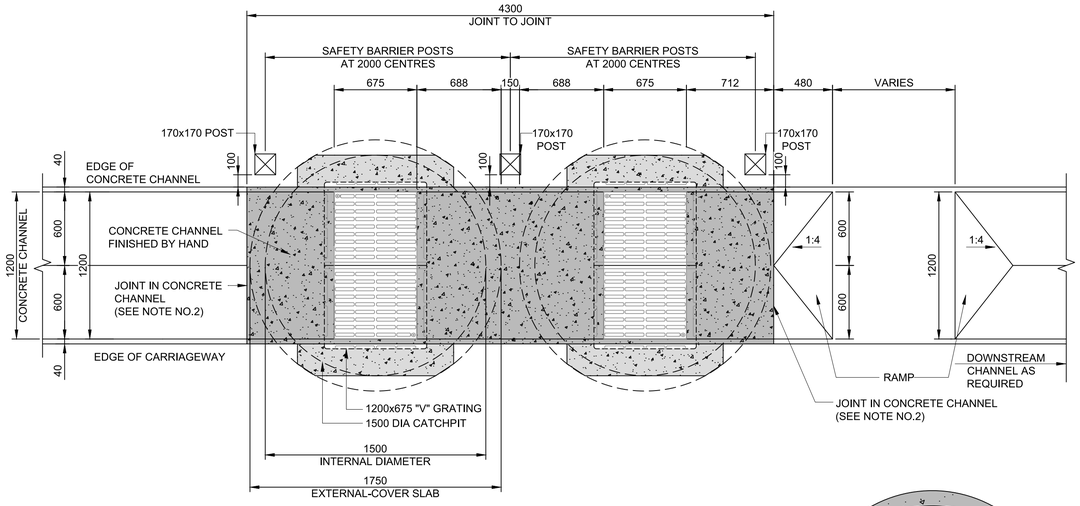
Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	S. KHANDRE
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

Drawing number: HE | PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3059

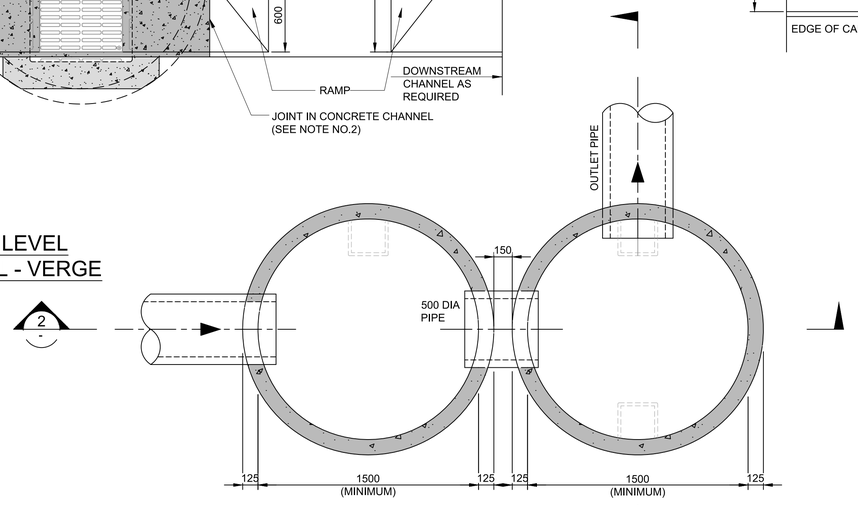
100mm on Original

Print Date: 2018-07-13 15:43:13

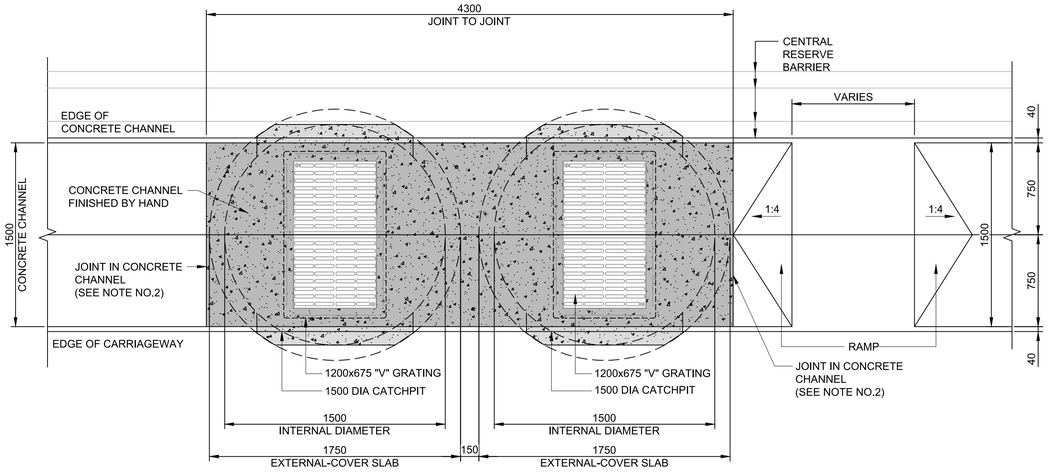
File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3056-3061.dwg



PLAN AT COVER LEVEL
1200 WIDE CHANNEL - VERGE

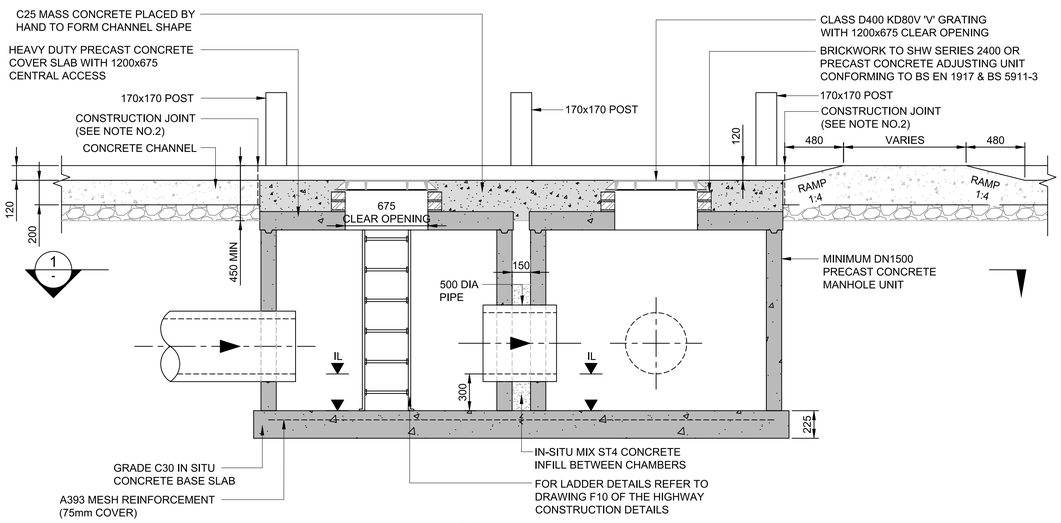


2

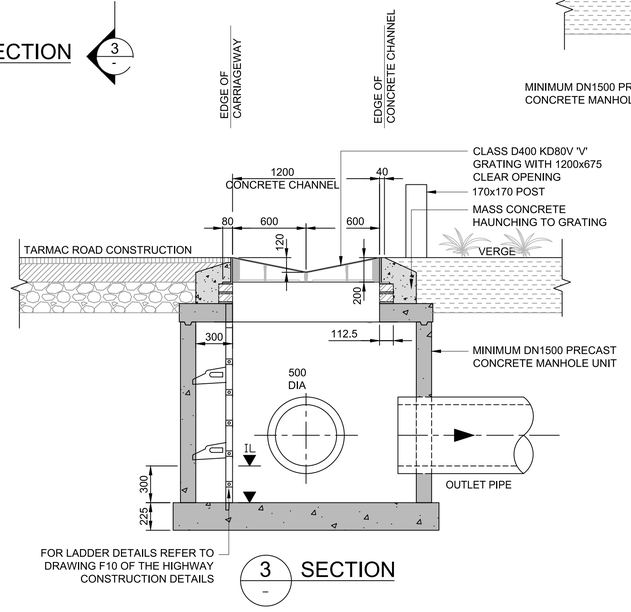


PLAN AT COVER LEVEL
1500 WIDE CHANNEL
CENTRAL RESERVE

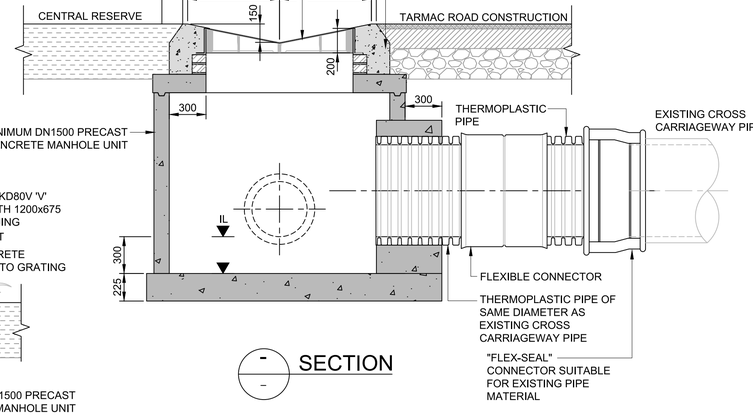
1 SECTION 3



2 SECTION



3 SECTION



- SECTION

NOTES

1. SAFETY CHAINS REQUIRED WHERE OUTLET PIPE IS 600 DIA OR GREATER.
2. CONSTRUCTION JOINT (TRANSVERSE JOINT) BETWEEN THE SLIP FORMED STORM WATER CHANNEL AND HAND-LAID SECTION (APRON SLAB) SHALL BE IN ACCORDANCE WITH THE HIGHWAY CONSTRUCTION DRAWINGS (HCD's), F SERIES DRAWINGS, DRAWING F22, NOTE 6.
3. THE DETAIL TO BE READ IN CONJUNCTION WITH PROPOSED DRAINAGE PLANS (HE548643-ARC-HDG-A585-DR-D-3324-3342).
4. ALL DIMENSIONS ARE IN MILIMETRES UNLESS SPECIFIED.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

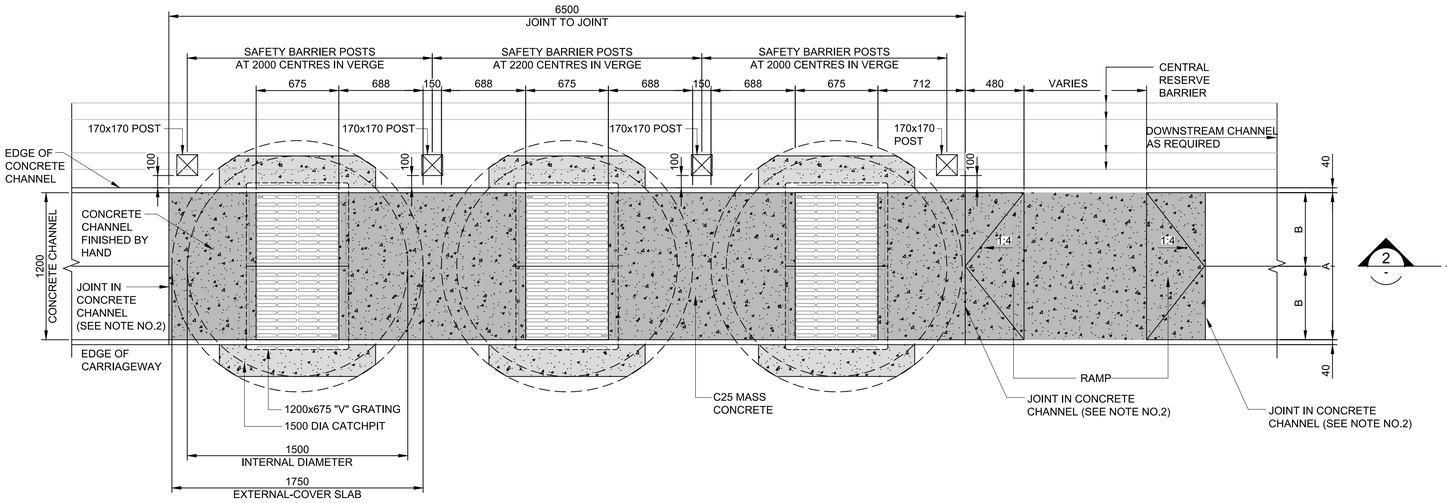
ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

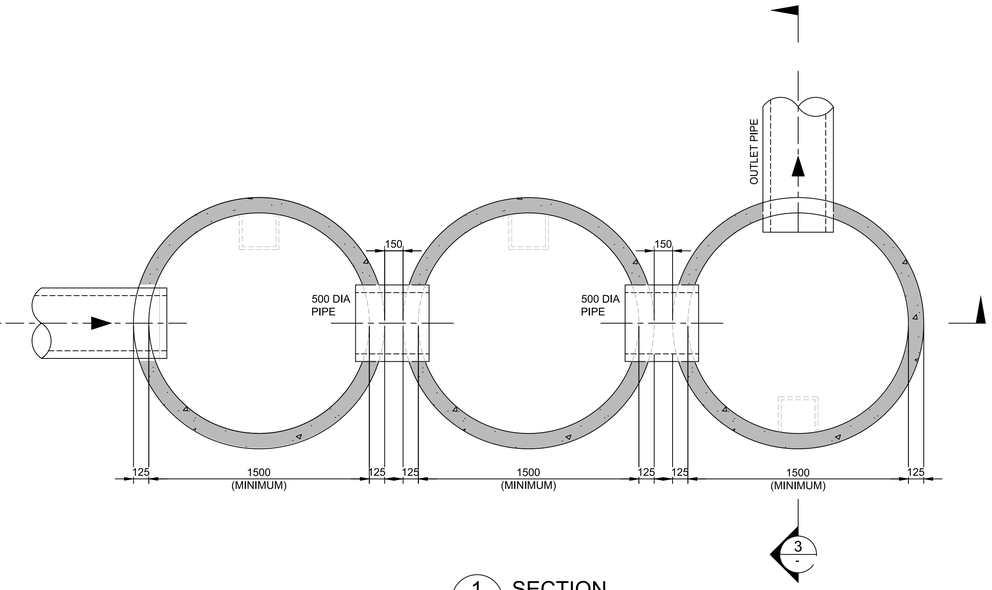
Drawing title: SURFACE WATER CHANNEL DETAILS 2 PAIR TERMINAL

Status	S3-PRELIMINARY DESIGN	Revision	P02
Scale	NTS	Date	10JUL2018
Drawn By	S. KHANDRE		
Checked By	A. COPE		
Approved By	N. HENDERSON		
		Original Size	A1

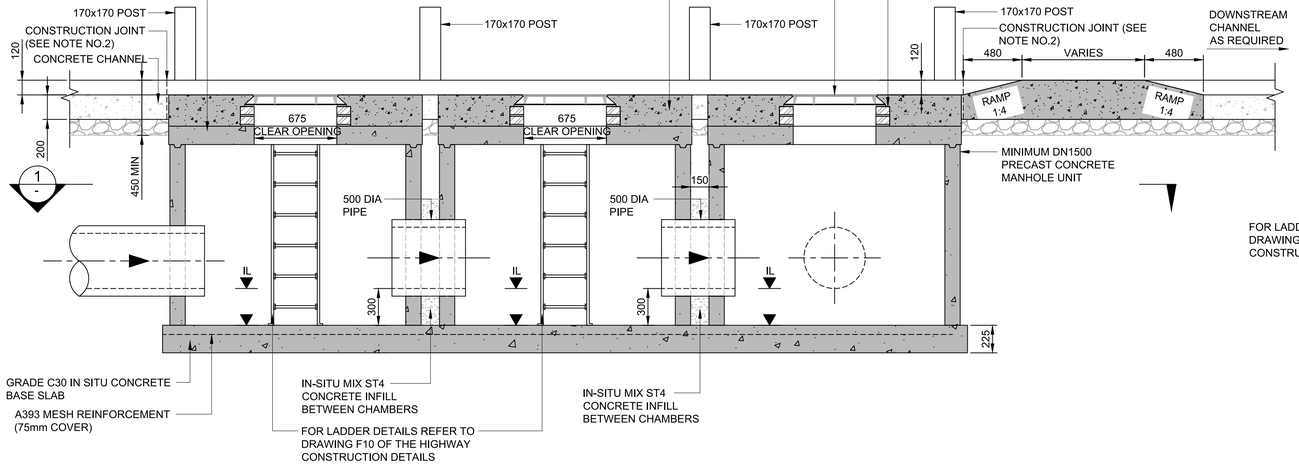
Drawing number: HE548643-ARC-HDG-SZ-GN_000-DE-D-3060



PLAN AT COVER LEVEL

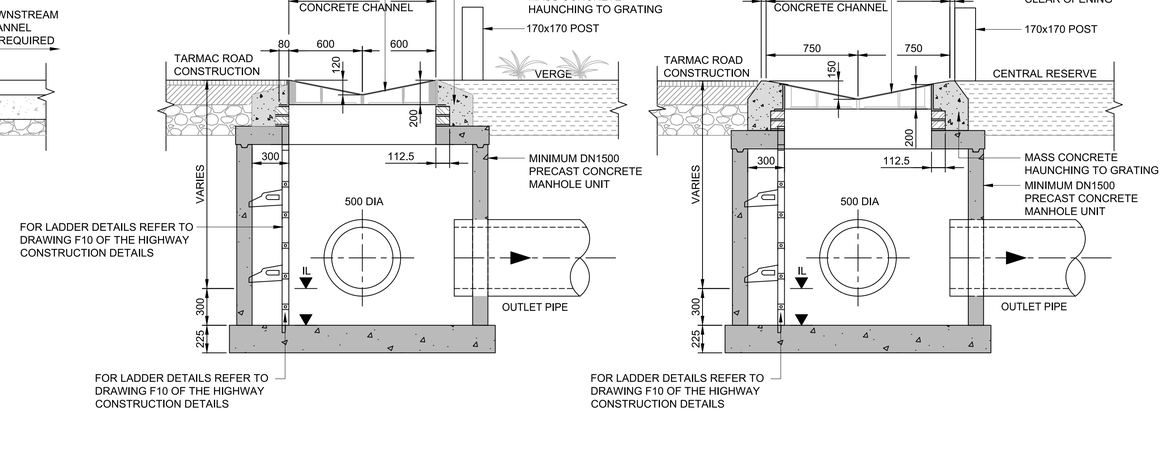


1 SECTION



2 SECTION

CHANNEL	DIMENSION		LOCATION
	A	B	
1200	1200	600	VERGE
1500	1500	750	CENTRAL RESERVE



3 SECTION

SECTION AT CENTRAL RESERVE

NOTES

1. SAFETY CHAINS REQUIRED WHERE OUTLET PIPE IS 600 DIA OR GREATER.
2. CONSTRUCTION JOINT (TRANSVERSE JOINT) BETWEEN THE SLIP FORMED STORM WATER CHANNEL AND HAND-LAID SECTION (APRON SLAB) SHALL BE IN ACCORDANCE WITH THE HIGHWAY CONSTRUCTION DRAWINGS (HCD's), F SERIES DRAWINGS, DRAWING F22, NOTE 6.
3. THE DETAIL TO BE READ IN CONJUNCTION WITH PROPOSED DRAINAGE PLANS (HE548643-ARC-HDG-A585-DR-D-3324-3342).
4. ALL DIMENSIONS ARE IN MILIMETRES UNLESS SPECIFIED.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: SURFACE WATER CHANNEL DETAILS 3 PAIR TERMINAL

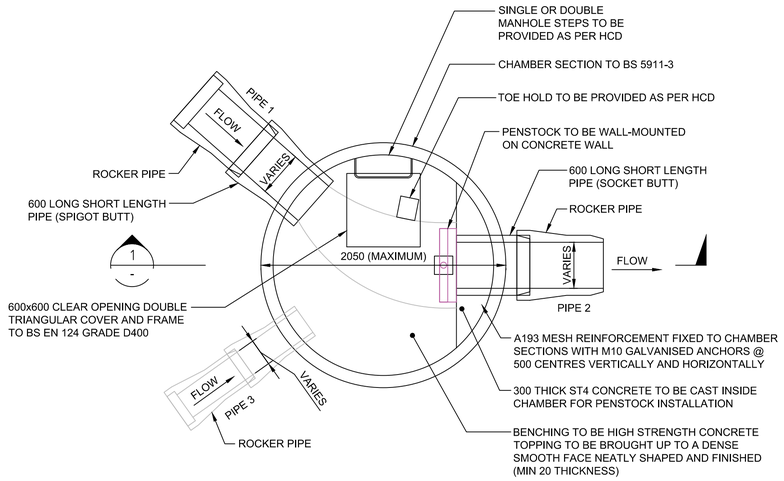
Status	S3-PRELIMINARY DESIGN	Revision	P02
Scale	NTS	Date	10JUL2018
Drawn By	S. KHANDRE		
Checked By	A. COPE		
Approved By	N. HENDERSON		
		Original Size	A1

Drawing number: HE548643-ARC-HDG-SZ-GN_000-DE-D-3061

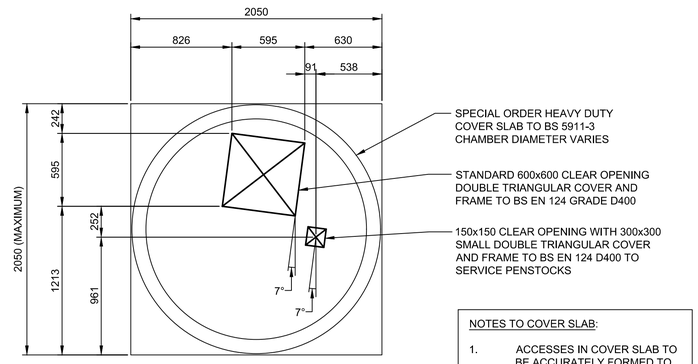
100mm on Original

Print Date: 2018-07-13 15:43:23

File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3056-3061.dwg



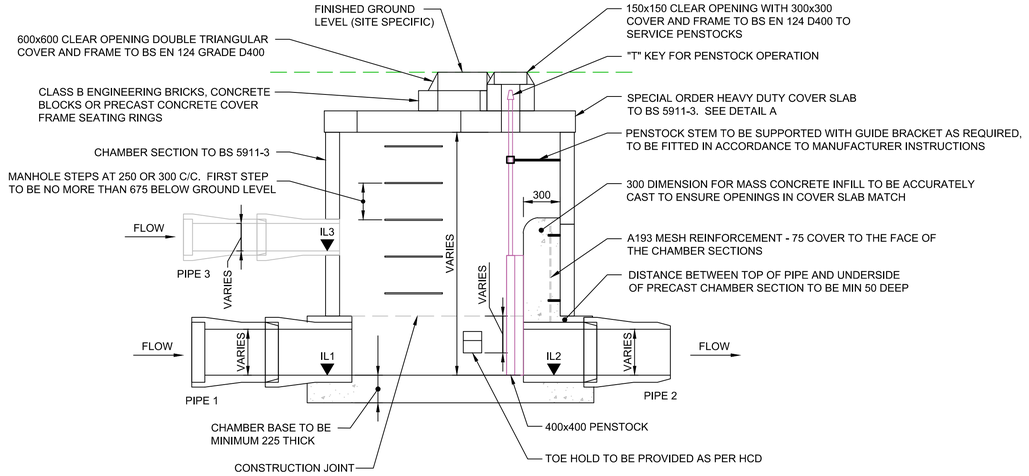
PLAN
SCALE 1 : 25



DETAIL A: COVER SLAB
SCALE 1 : 25

NOTES TO COVER SLAB:

1. ACCESSES IN COVER SLAB TO BE ACCURATELY FORMED TO DIMENSIONS SHOWN TO ENSURE PENSTOCK CAN BE PROPERLY OPERATED THROUGH ACCESS POINT
2. TYPICAL COVER TO ALL REINFORCEMENT TO BE 75



SECTION 1
SCALE 1 : 25

FLOW CONTROL CHAMBER DETAIL

CATCHMENT	CHAMBER NO.	CHAMBER DIA (mm)	ORIFICE DIA (mm)	PIPE (1) PN	PIPE (1) DIA (mm)	PIPE (1) IL (m)	PIPE (2) PN	PIPE (2) DIA (mm)	PIPE (2) IL (m)	PIPE (3) PN	PIPE (3) DIA (mm)	PIPE (3) IL (m)
1	M1-F-01	1800	125	1.018	600	4.405	23.001	150	5.267	-	-	-
	M1-F-02	1500	200	1.026	375	4.224	35.004	450	4.556	-	-	-
	M1-F-04	1500	150	39.001	225	5.144	41.002	450	4.650	-	-	-
2	M2-F-01	2100	100	1.016	600	3.326	30.000	150	4.433	31.000	150	4.103
	M2-F-02	1500	100	32.005	450	3.342	36.001	150	4.669	-	-	-
3	M3-F-01	1500	200	21.021	450	3.998	47.010	500	4.028	-	-	-
	M3-F-02	1800	125	21.018	700	5.251	39.000	150	6.323	40.000	150	6.333
	M3-F-03	1500	150	60.001	450	3.450	65.006	150	3.450	74.000	150	5.018
9	M9-F-01	1200	150	1.005	450	5.486	7.000	150	5.786	-	-	-

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES UNLESS OTHERWISE STATED.
2. REFER TO DRAWING SERIES 0501 DRAINAGE LAYOUT PLANS AND DRAWING SERIES 0500 DRAINAGE SCHEDULE FOR DRAINAGE INFORMATION
3. SPECIFIC PRODUCT DETAILS AND INSTALLATION SHOULD BE IN ACCORDANCE WITH THE MANUFACTURER INSTRUCTIONS.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

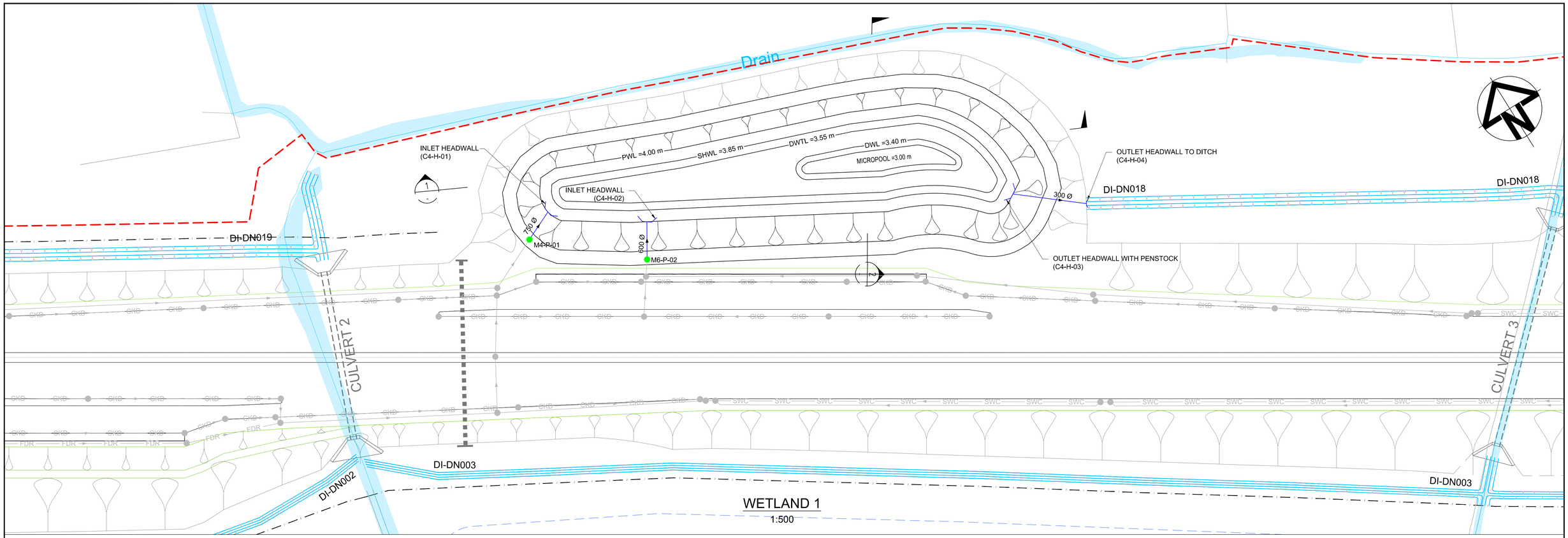
Drawing title: PROPOSED DRAINAGE PENSTOCK AND ORIFICE CHAMBER TYPICAL DETAILS

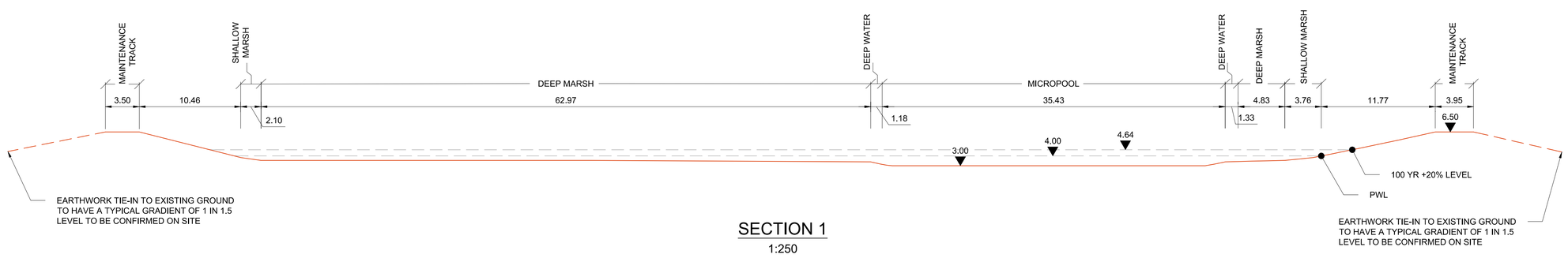
Status	PRELIMINARY DESIGN	Revision	P02
Scale	1:25	Date	10JUL2018
Drawn By	SURESH.G		
Checked By	A. COPE		
Approved By	N. HENDERSON		
		Original Size	A1

Drawing number: HE HE548643-ARC-HDG-SZ-GN_000-DE-D-3062 (HE PIN | Originator | Volume | Location | Type | Role | Number)

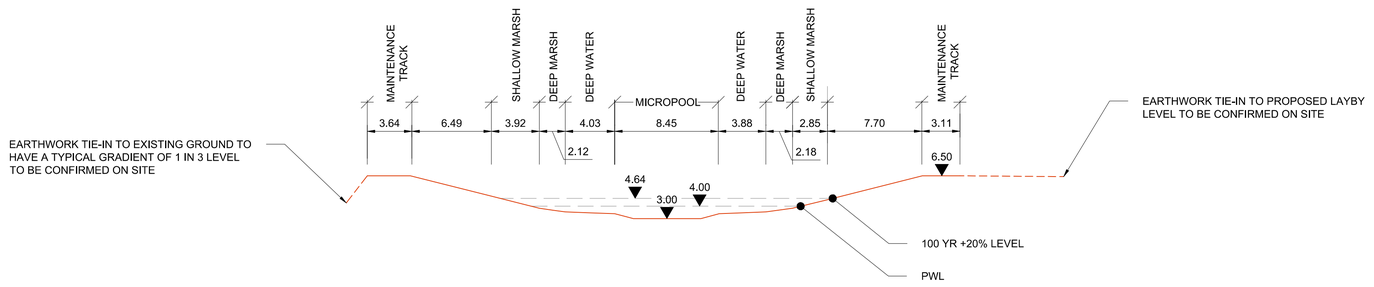
100mm on Original

Print Date: 2018-07-13 18:12:27
File Path: K:\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3062.dwg





SECTION 1
1:250



SECTION 2
1:250

NOTES

REFER TO DRAWING HE548643-ARC-HDG-S1-ML_001-DR-D-3035 TO 3055 FOR PROPOSED DRAINAGE PLAN.

LEGEND

PWL = PERMANENT WATER LEVEL
SHWL = SHALLOW WETLAND
DWTL = DEEP WETLAND
DW = DEEP WATER

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	PD	22DEC2017	PRELIMINARY DSIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 603 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: DRAINAGE STORMWATER WETLAND 1 PLAN AND SECTION

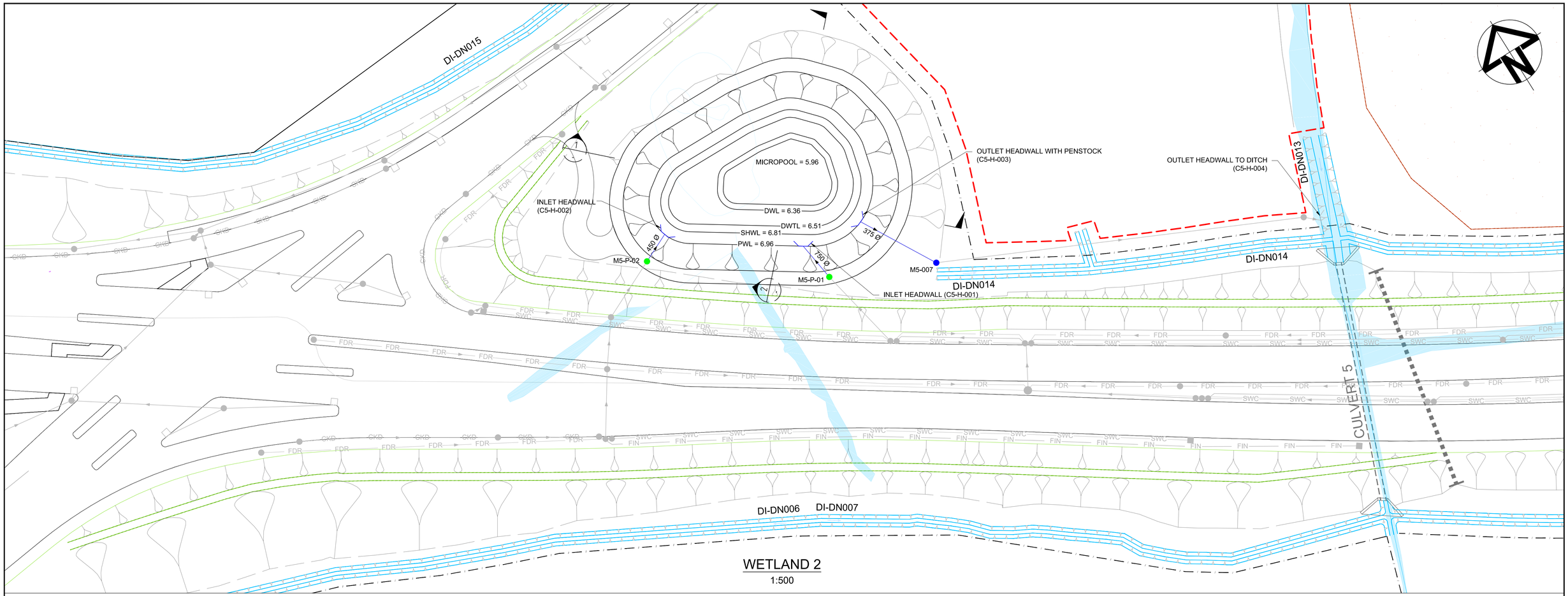
Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	AS SHOWN
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

Drawing number: HE HE548643-ARC-HDG-SZ-GN_000-DE-D-3063

100mm on Original

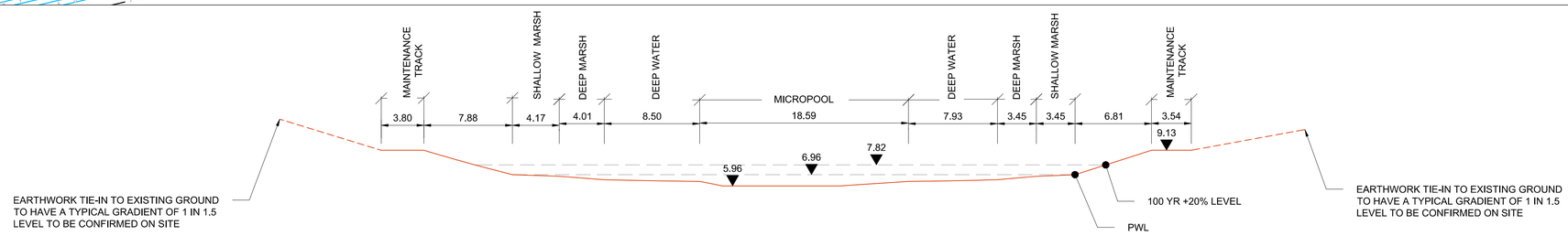
Print Date: 2018-07-13 20:51:09

File Path: K:\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3063-3066.dwg



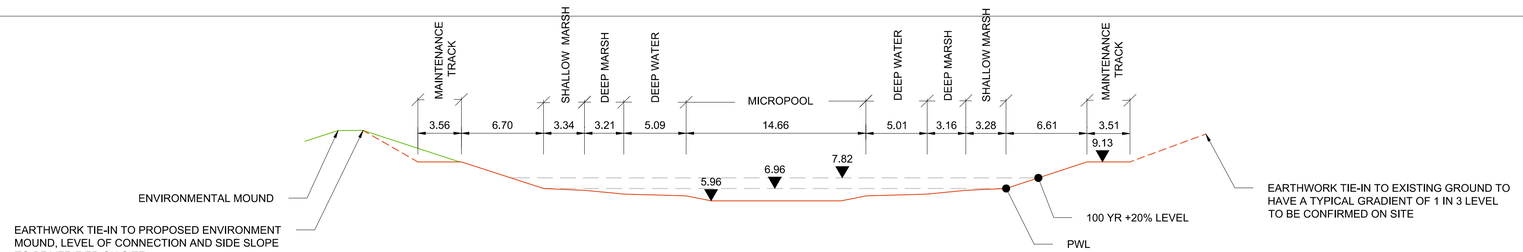
WETLAND 2

1:500



SECTION 1

1:250



SECTION 2

1:250

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	PD	22DEC2017	PRELIMINARY DSIGN	SK	AC	NH

NOTES

REFER TO DRAWING HE548643-ARC-HDG-S1-ML_001-DR-D-3035 TO 3055 FOR PROPOSED DRAINAGE PLAN.

LEGEND

PWL = PERMANENT WATER LEVEL
SHWL = SHALLOW WETLAND
DWTL = DEEP WETLAND
DW = DEEP WATER

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: DRAINAGE STORMWATER WETLAND 2 PLAN AND SECTION

Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	AS SHOWN
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

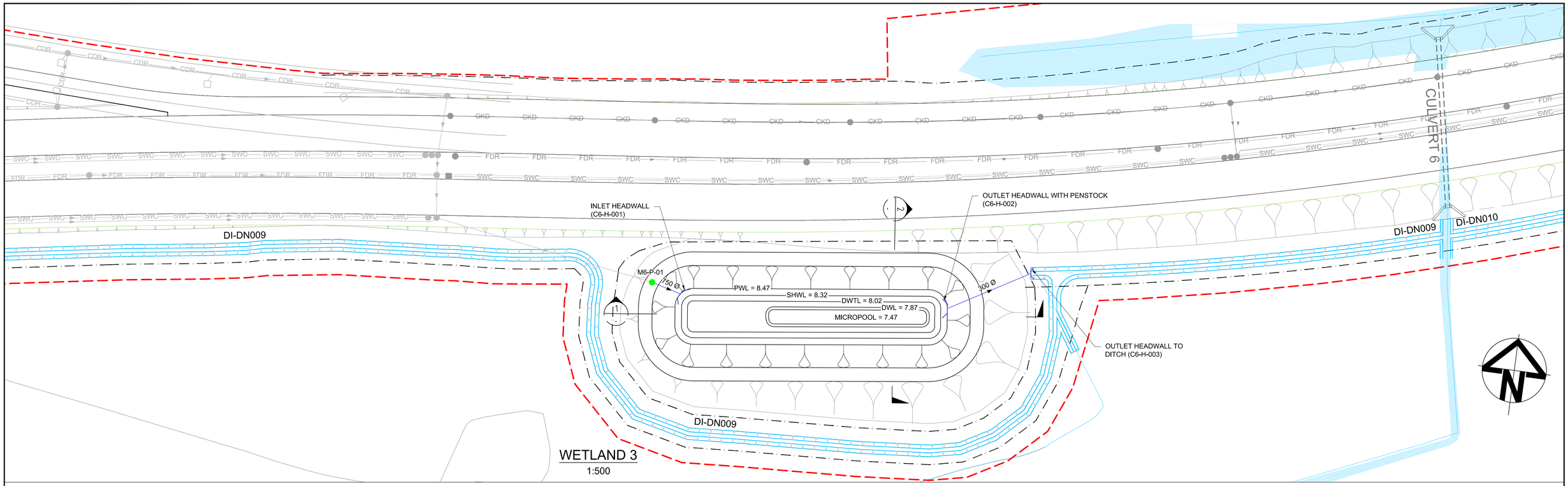
Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-SZ-GN_000-DE-D-3064

100mm on Original

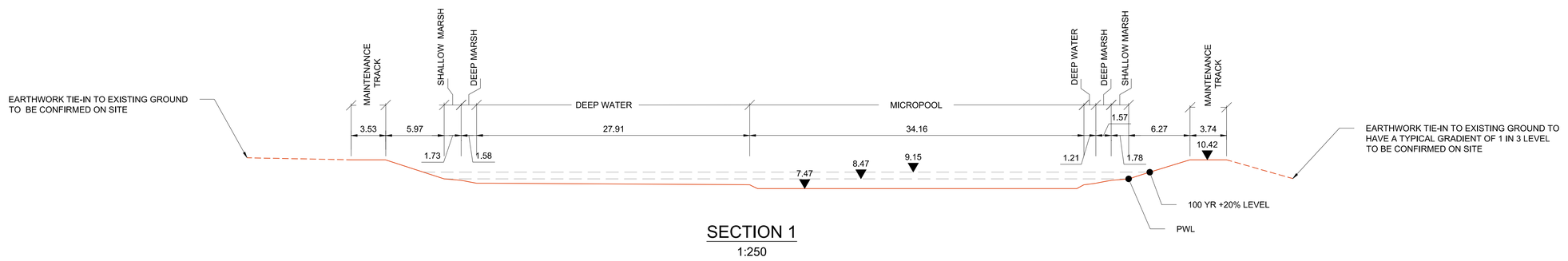
Print Date: 2018-07-13 21:42:44

File Path: K:\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3063-3066.dwg



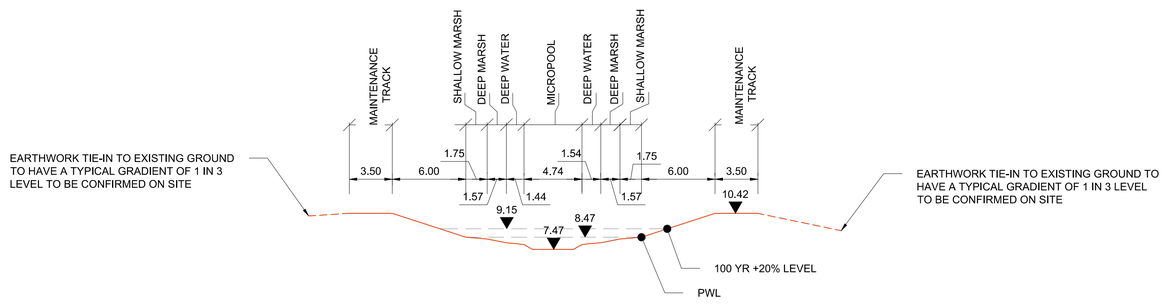
WETLAND 3

1:500



SECTION 1

1:250



SECTION 2

1:250

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	PD	22DEC2017	PRELIMINARY DSIGN	SK	AC	NH

NOTES

REFER TO DRAWING HE548643-ARC-HDG-S1-ML_001-DR-D-3035 TO 3055 FOR PROPOSED DRAINAGE PLAN.

LEGEND

PWL = PERMANENT WATER LEVEL
SHWL = SHALLOW WETLAND
DWTL = DEEP WETLAND
DW = DEEP WATER

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House 34 York Way London N1 9AB
Coordinating office: The Surrey Research Park 10 Medawar Road Guildford GU2 7AR Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: DRAINAGE STORMWATER WETLAND 3 PLAN AND SECTION

Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	AS SHOWN
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

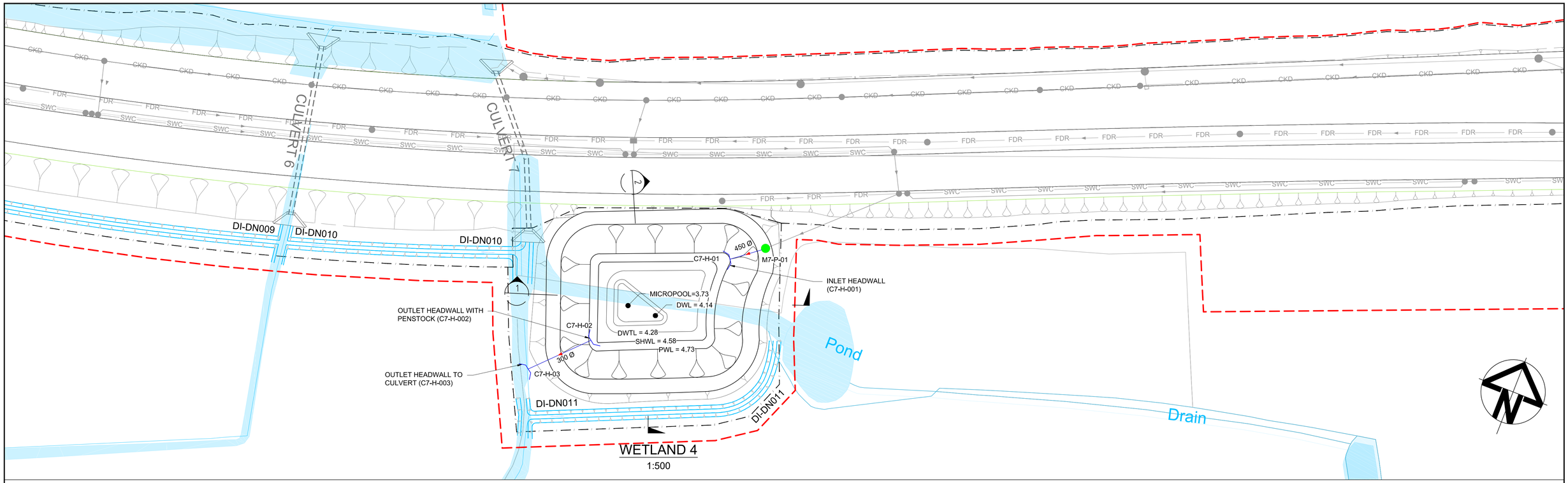
Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number

HE548643-ARC-HDG-SZ-GN_000-DE-D-3065

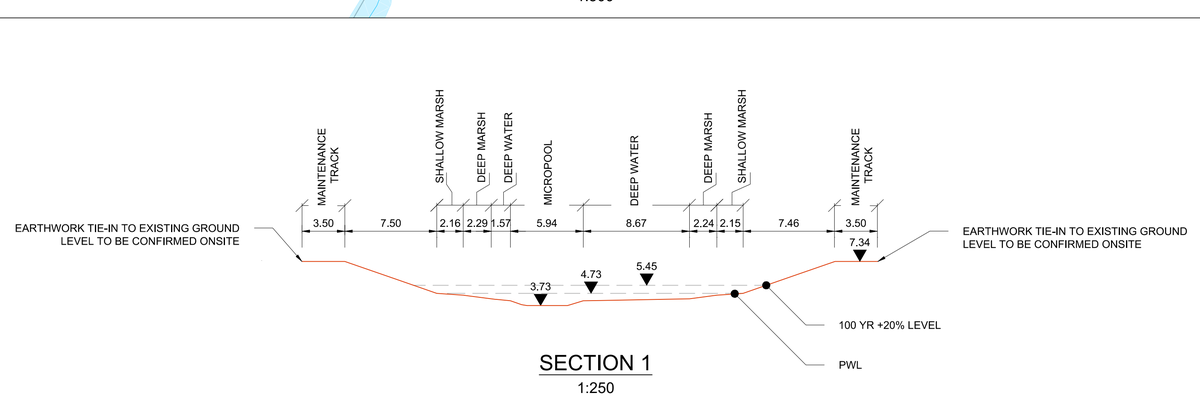
100mm on Original

Print Date: 2018-07-13 21:37:53

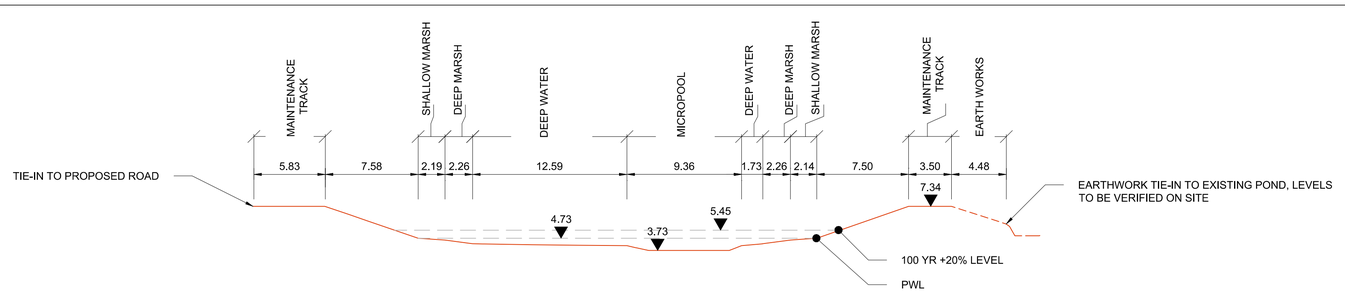
File Path: K:\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3063-3066.dwg



WETLAND 4
1:500



SECTION 1
1:250



SECTION 2
1:250

NOTES

REFER TO DRAWING HE548643-ARC-HDG-S1-ML_001-DR-D-3035 TO 3055 FOR PROPOSED DRAINAGE PLAN.

LEGEND

PWL = PERMANENT WATER LEVEL
SHWL = SHALLOW WETLAND
DWTL = DEEP WETLAND
DW = DEEP WATER

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH
P01	PD	22DEC2017	PRELIMINARY DSIGN	SK	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House 34 York Way London N1 9AB
Coordinating office: The Surrey Research Park 10 Medawar Road Guildford GU2 7AR Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: DRAINAGE STORMWATER WETLAND 4 PLAN AND SECTION

Status	S3-PRELIMINARY DESIGN
Revision	P02
Scale	AS SHOWN
Date	10JUL2018
Drawn By	G.SURESH
Checked By	A. COPE
Approved By	N. HENDERSON
Original Size	A1

Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3066

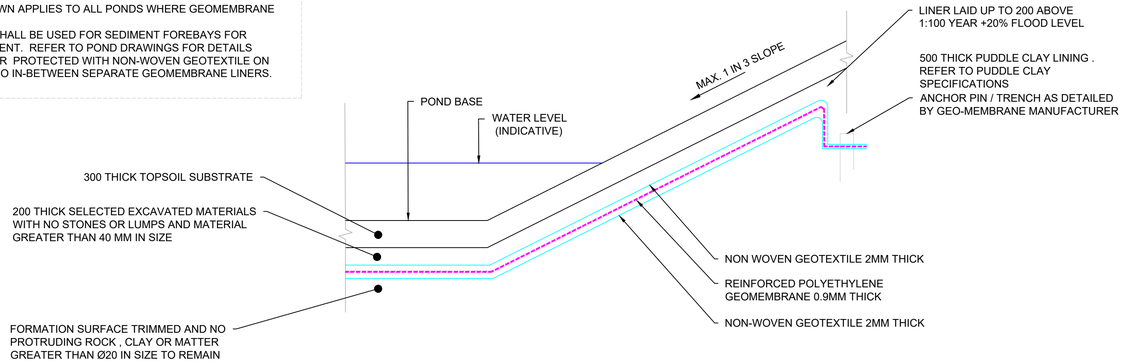
100mm on Original

Print Date: 2018-07-13 21:55:20

File Path: K:\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3063-3066.dwg

REINFORCED POLYETHYLENE GEOMEMBRANE NOTES:

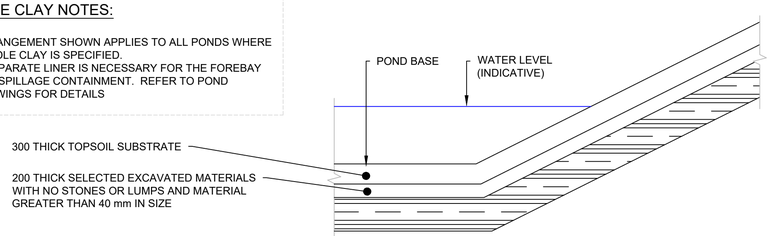
1. ARRANGEMENT SHOWN APPLIES TO ALL PONDS WHERE GEOMEMBRANE LINER IS SPECIFIED.
2. A SEPARATE LINER SHALL BE USED FOR SEDIMENT FOREBAYS FOR SPILLAGE CONTAINMENT. REFER TO POND DRAWINGS FOR DETAILS
3. GEOMEMBRANE LINER PROTECTED WITH NON-WOVEN GEOTEXTILE ON BOTH SIDES AND ALSO IN-BETWEEN SEPARATE GEOMEMBRANE LINERS.



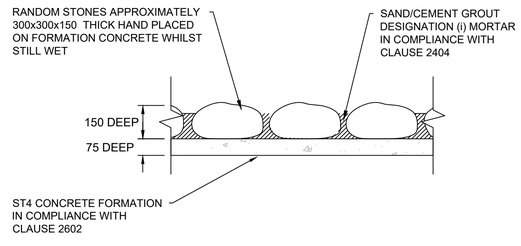
REINFORCED POLYETHYLENE GEOMEMBRANE LINER DETAIL

PUDDLE CLAY NOTES:

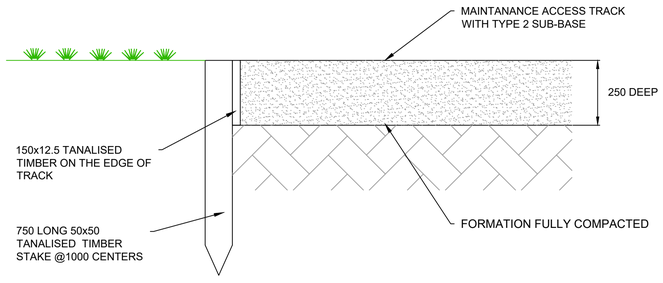
1. ARRANGEMENT SHOWN APPLIES TO ALL PONDS WHERE PUDDLE CLAY IS SPECIFIED.
2. A SEPARATE LINER IS NECESSARY FOR THE FOREBAY FOR SPILLAGE CONTAINMENT. REFER TO POND DRAWINGS FOR DETAILS



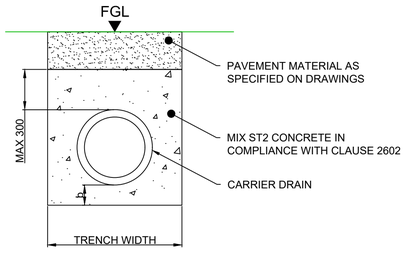
PUDDLE CLAY DETAIL



STONE PITCHING DETAIL



MAINTANANCE ACCESS TRACK DETAILS



CONCRETE BEDDING AND SURROUND DETAIL

CONCRETE BEDDING AND SURROUND NOTES:

1. CONCRETE PROTECTION TO PIPE PROVIDED WHERE COVER TO SOFFIT IS LESS THAN 600
2. TRENCH WIDTH AND DIMENSION "b" SHOULD REFER TO HCD F1

SPECIFICATIONS ON GEOTEXTILE :

GENERAL

1. GEOTEXTILE SYNTHETIC NON-WOVEN. THERMALLY BONDED OR MECHANICALLY NEEDLED FABRIC COMPOSED OF POLYPROPYLENE OR POLYETHYLENE FIBRES.
2. JOINTING OVERLAPPING ONLY AND ALL OVERLAPS HAVE A MINIMUM OF 300mm.

APPLICABLE TO STORMWATER WETLANDS ONLY:

SUBSTRATE OF VARIED DEPTHS :

1. SIDE SLOPES - TOPSOIL.
2. SHALLOW MARSHLAND - 150 TOPSOIL AND WASHED GRAVEL LAID UPON 350 OF SELECTED EXCAVATED MATERIAL WITH NO STONES OR LUMPS OF MATERIAL GREATER THEN 40 N SIZE.
3. DEEP MARSHLAND 150 MIXED TOPSOIL AND GRAVEL LAID UPON 350 OF SELECTED EXCAVATED MATERIAL WITH NO STONES OR LUMPS OF MATERIAL GREATER THEN 40 N SIZE.
4. DEEP WATER - 100 OF COARSE ORGANIC SOIL LAID UPON 400 OF GRAVEL
3. MICROPOOL - 500 OF SELECTED EXCAVATED MATERIAL WITH NO STONES OR LUMPS OF MATERIAL GREATER THEN 40 N SIZE.

FOR DEPTHS FOR SPECIFIC AREA OF WETLAND REQUIRED FOR PLANTING REFER TO LANDSCAPE DRAWING SERIES 3000.

GEOMEMBRANE SPECIFICATIONS:

GENERAL

UNIT WEIGHT (g/m²) = 628
THICKNESS (2 kN/m² PRESSURE) = 0.9mm

MACHINE DIRECTION

TENSILE STRENGTH (kN/m) = 24.7
ELONGATION AT STRAIN (%) = 33
TRAPEZOID TEAR STRENGTH (N) = 545

CROSS DIRECTION

TENSILE STRENGTH (kN/m) = 24.34
ELONGATION AT STRAIN (%) = 31
TRAPEZOID TEAR STRENGTH (N) = 381

STATIC PUNCTURE (CBR)

PUSH-THROUGH FORCE (kN) = 2.2
DISTENSION AT PEAK (mm) = 38
DROP CONE TEST (mm) = 7.4

DURABILITY

OXIDATION RESISTANCE TEST (AGE-%) = 11.58
UV EXPOSURE RESISTANCE = 90%

PUDDLE CLAY SPECIFICATIONS:

1. PUDDLE CLAY PRODUCED FROM A CLAY WITH A LIQUID LIMIT BETWEEN 30 AND 60 AND A PLASTICITY INDEX WHICH IS GREATER THAN THE DIFFERENCE BETWEEN 0.73 TIMES THE LIQUID LIMIT AND 15. IT FREE FROM TOP SOIL, ROOTS, PEAT AND ANY OTHER ORGANIC SOLUBLE MATERIAL. IT SHALL ALSO BE FREE FROM BOULDERS, COBBLES AND GRAVEL EXCEEDING 20MM IN SIZE AND SHALL HAVE A CLAY FRACTION, AS MEASURED IN ACCORDANCE WITH BS1377, GREATER THAN 30%.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	S3	10JUL2018	PRELIMINARY DESIGN	SG	AC	NH

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED.

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: DRAINAGE STORM WATER WETLAND STANDARD DETAILS

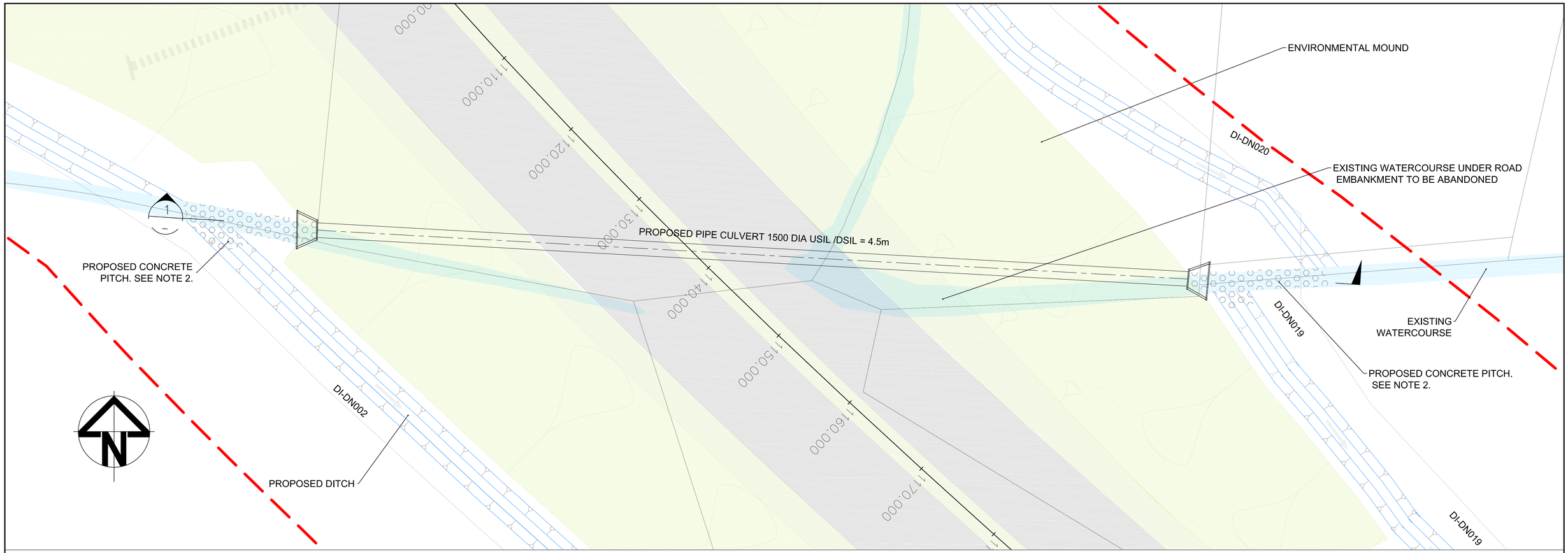
Status	PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date	10JUL2018
Drawn By	SURESH.G
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

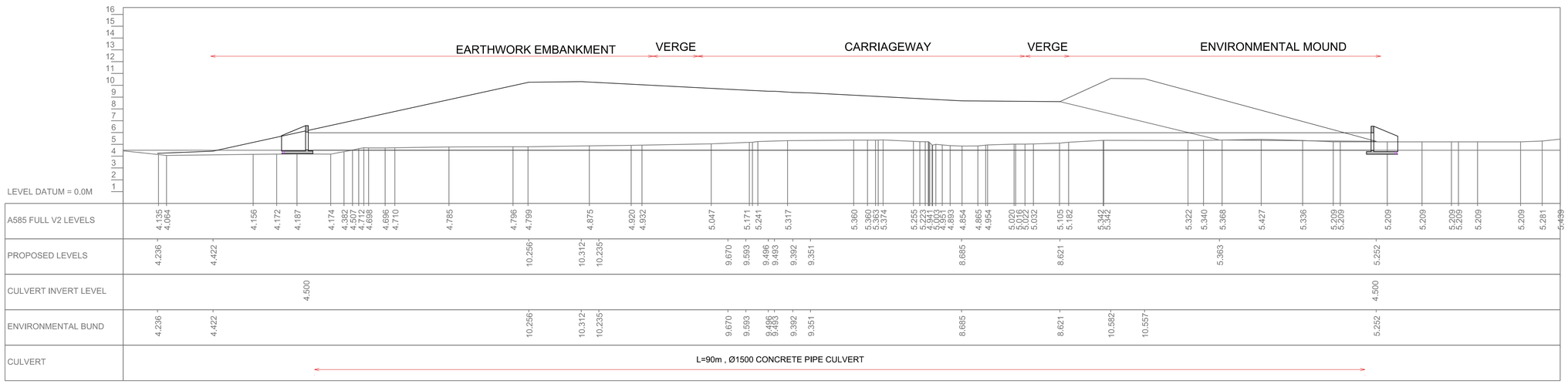
Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3067

100mm on Original

Print Date: 2018-07-13 15:40:02

File Path: \\hc-ukr-hy-fs-10\HY_Proj\Highways\UKR\UB004249-01-A585 Drainage\E-Drawings\Working Drawings\Drawings\Standard Details\P03\HE548643-ARC-HDG-SZ-GN_000-DE-D-3067.DWG





SECTION 1 -

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED PLAN AND SECTION FOR CULVERT 1 CH 1+140

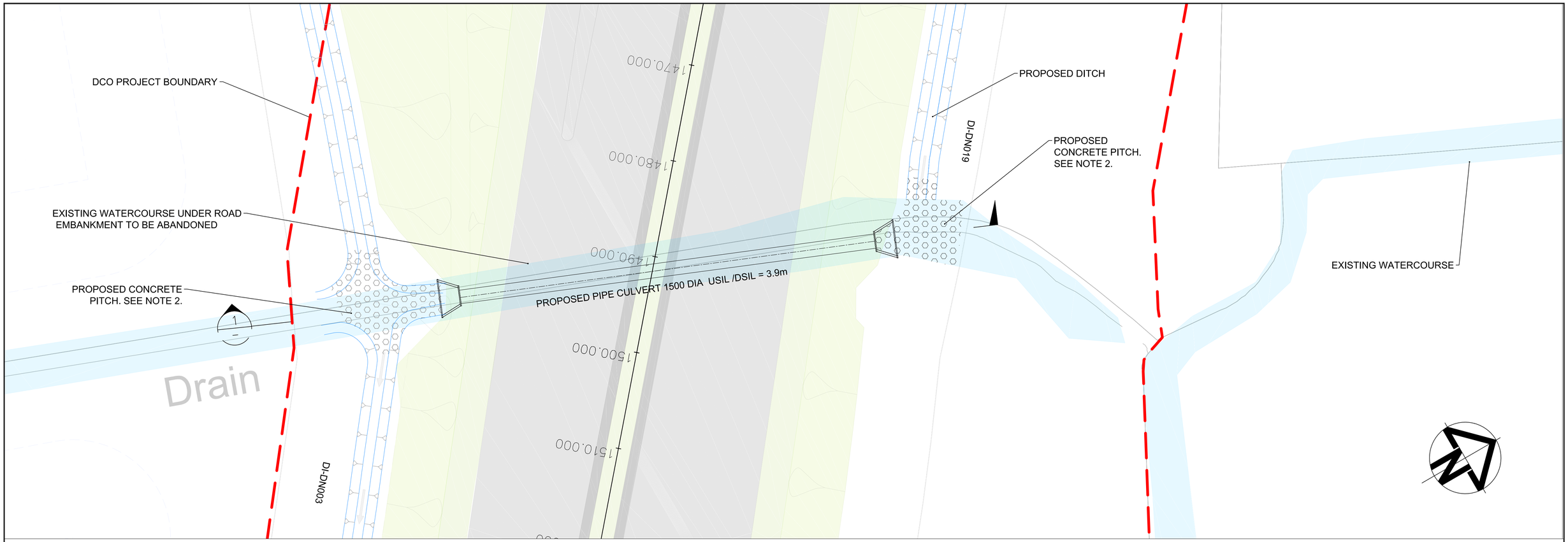
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

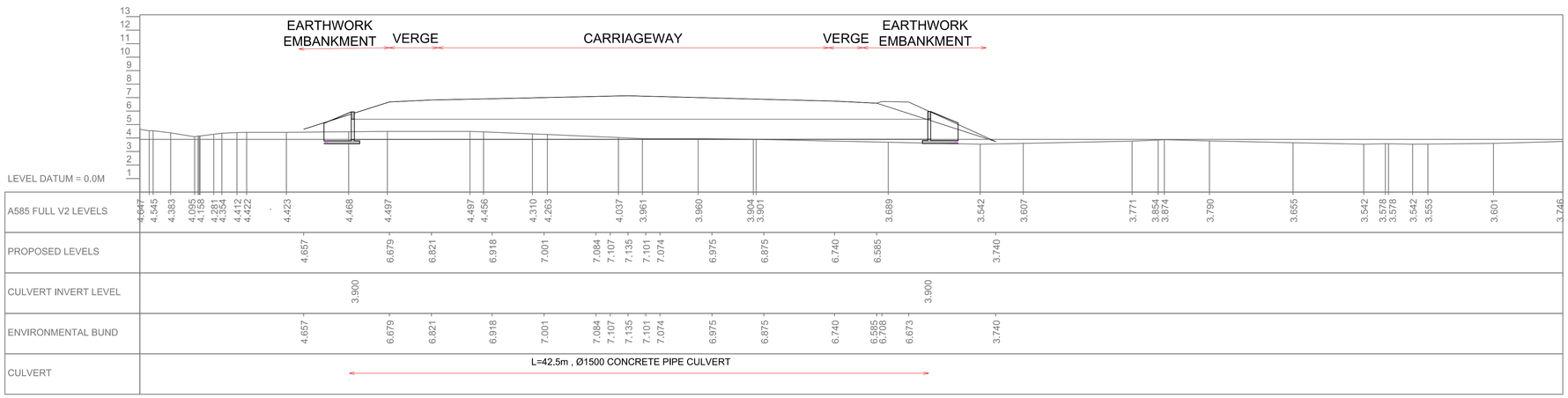
Drawing number: HE548643-ARC-HDG-SZ-GN_000-DE-D-3068

100mm on Original

Print Date: 2018-07-13 22:45:09

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg





SECTION 1 -

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED PLAN AND SECTION FOR CULVERT 2 CH 1+490

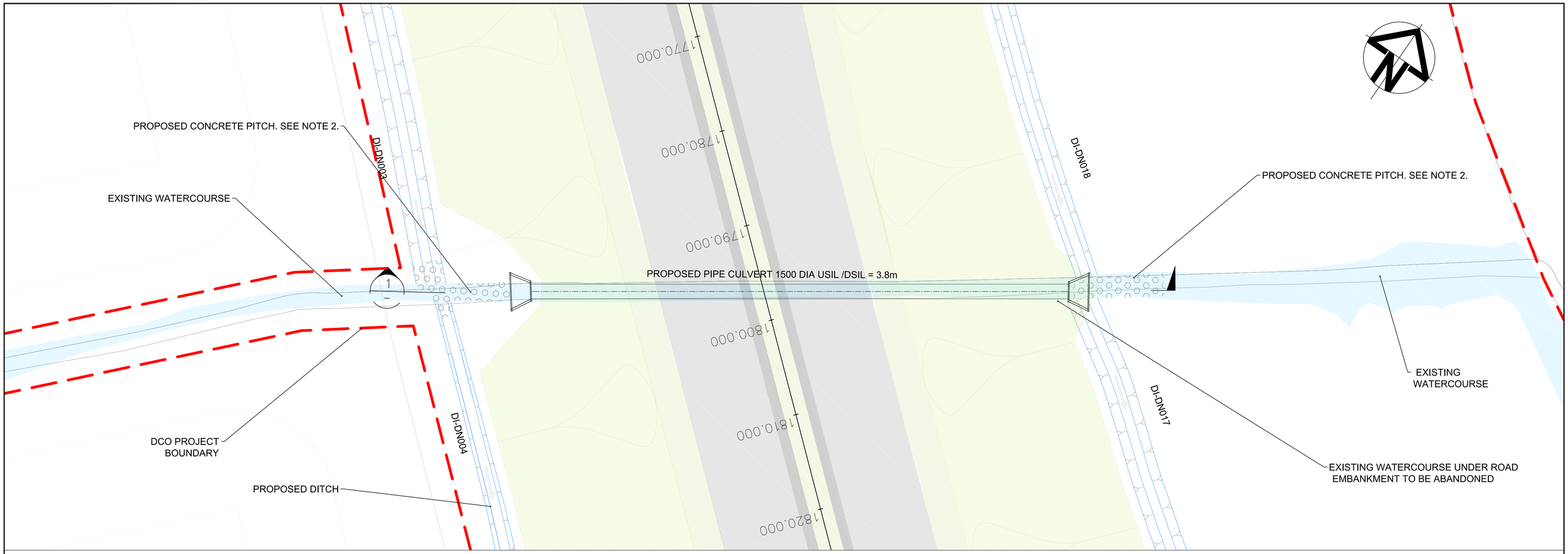
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

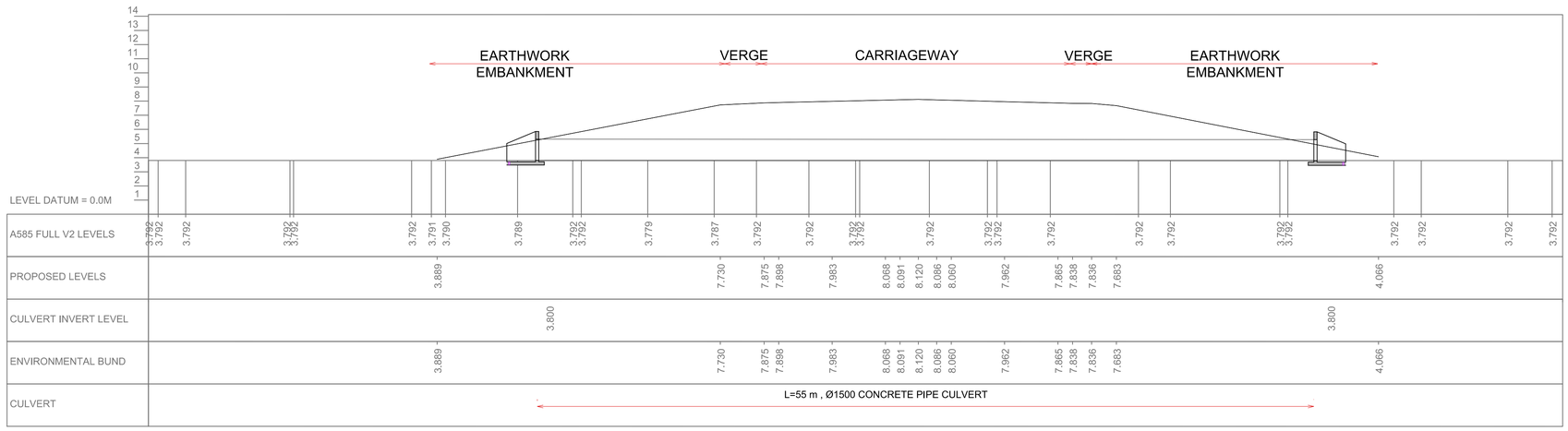
Drawing number: HE548643-ARC-HDG-SZ-GN_000-DE-D-3069 (HE PIN | Originator | Volume | Location | Type | Role | Number)

100mm on Original

Print Date: 2018-07-13 22:45:36

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg





SECTION 1 -

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED PLAN AND SECTION FOR CULVERT 3 CH 1+795

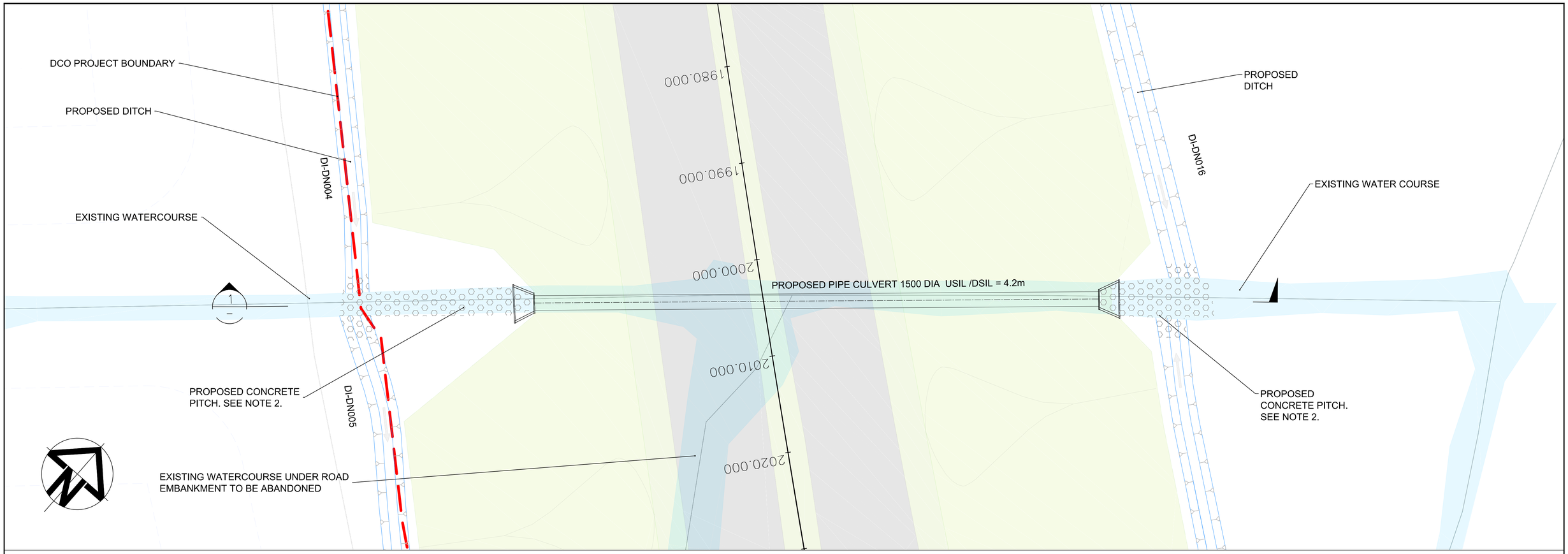
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

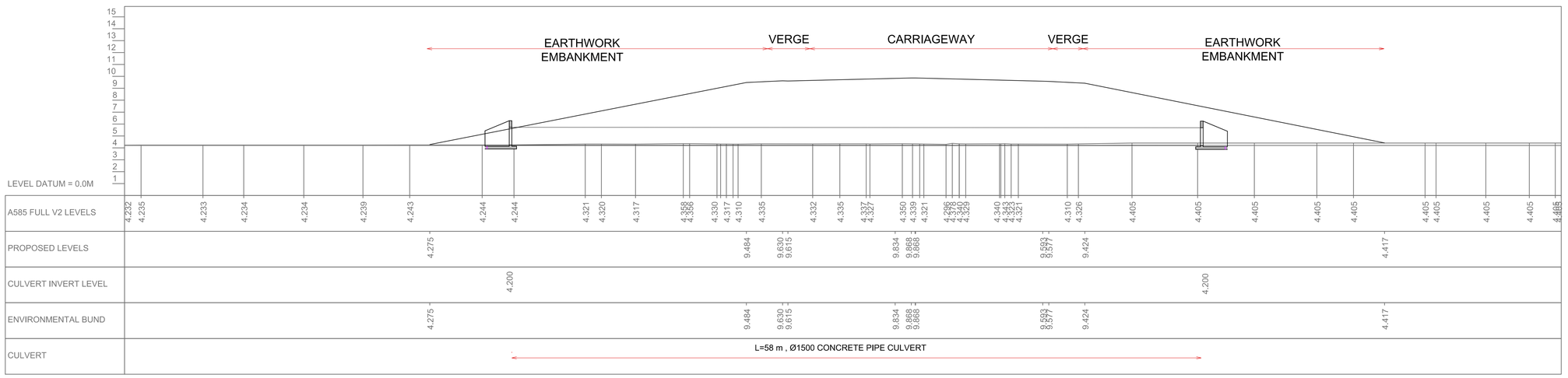
Drawing number: HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3070

100mm on Original

Print Date: 2018-07-13 22:46:10

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg





SECTION 1 –

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED PLAN AND SECTION FOR CULVERT 4 CH 2+005

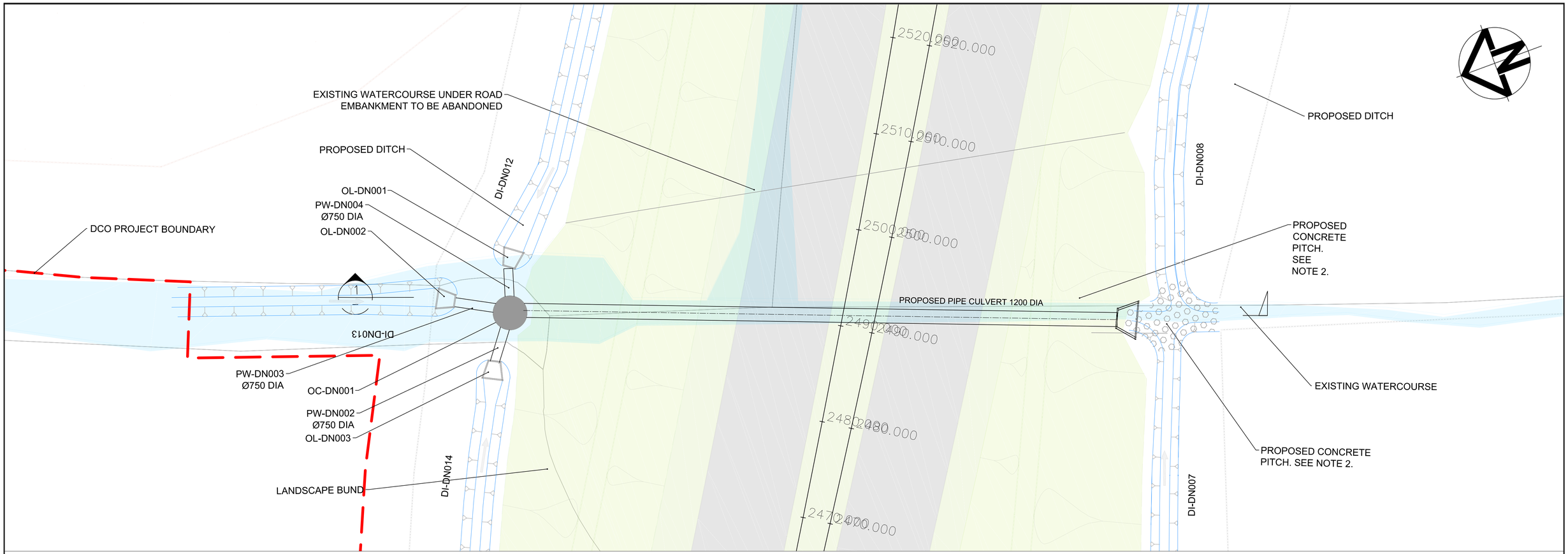
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

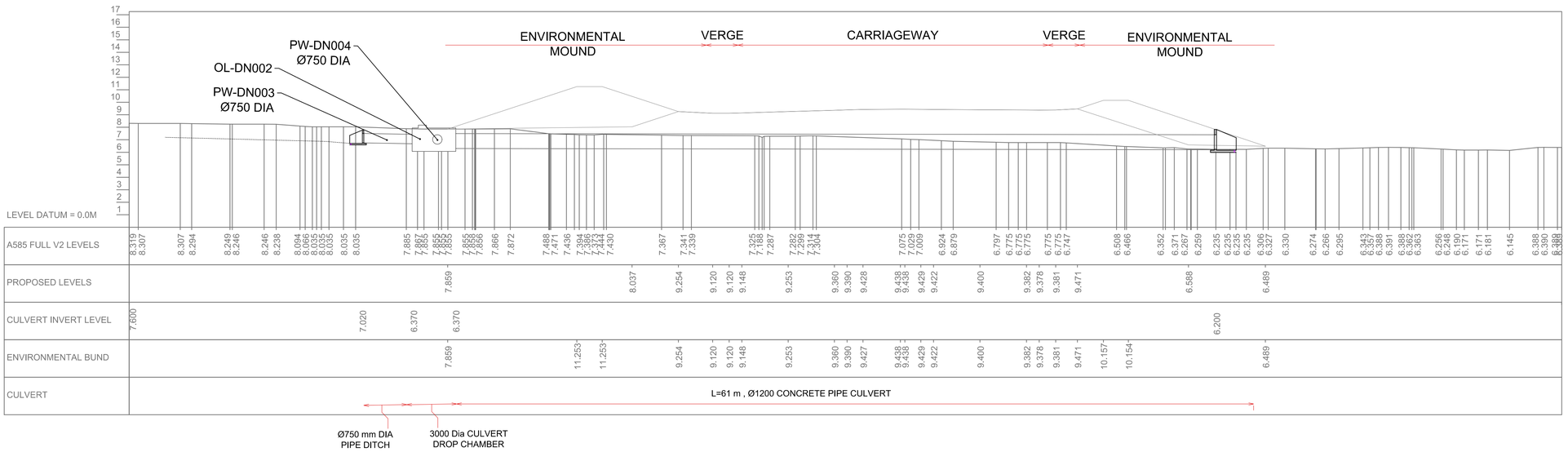
Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-HDG-SZ-GN_000-DE-D-3071

100mm on Original

Print Date: 2018-07-13 22:46:41

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg





SECTION 1 - 1

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PROPOSED PLAN AND SECTION FOR CULVERT 5 CH 2+490

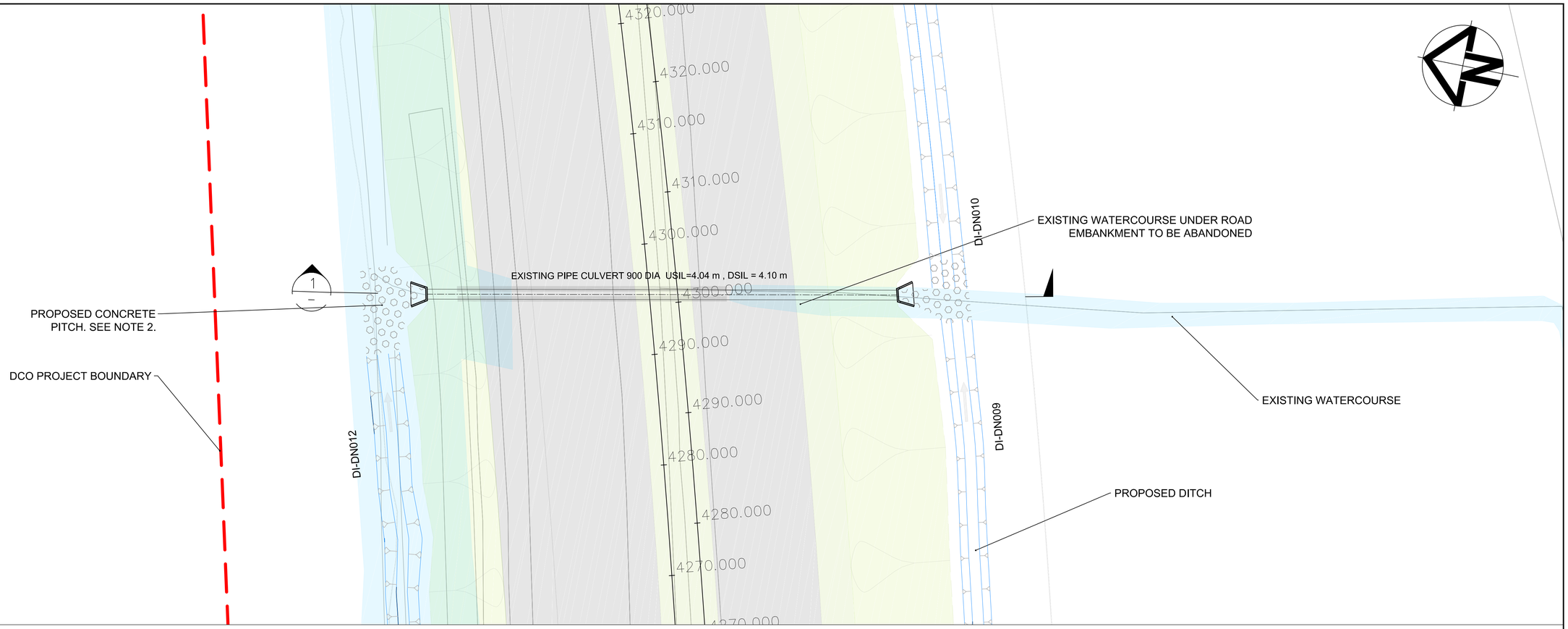
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

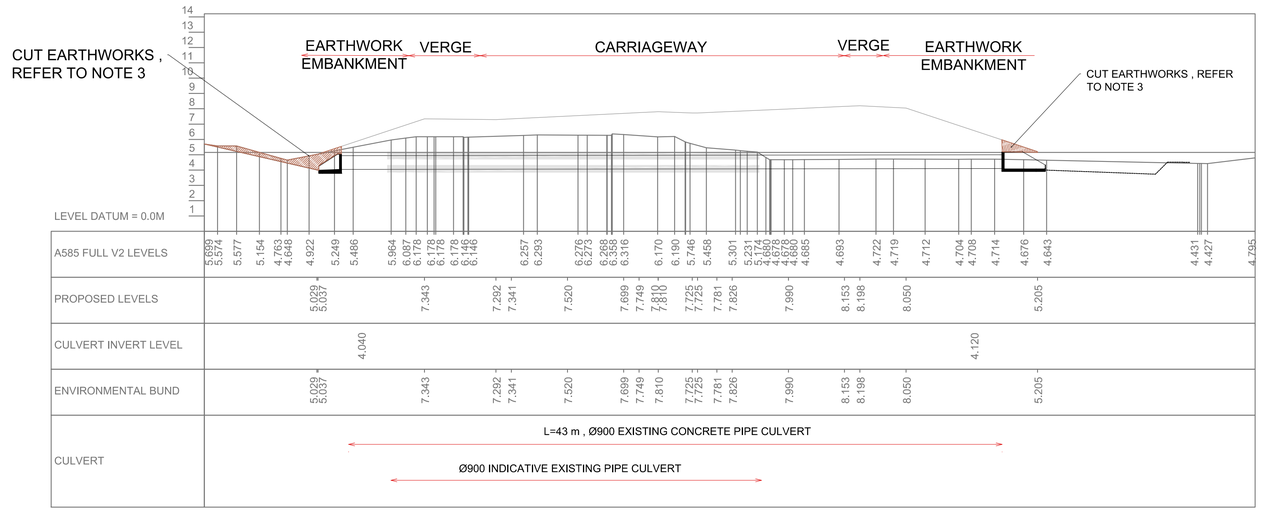
Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3072

100mm on Original

Print Date: 2018-07-13 22:47:11

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg





SECTION 1 -

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.
6. LENGTH OF EXISTING CULVERT IS INDICATIVE , TO BE VERIFIED WITH FURTHER CCTV AND ASSET SURVEY DURING STAGE 5. NO CCTV INFORMATION AVAILABLE AT THIS STAGE , REFER TO EXISTING DRAINAGE AND SITE CLEARANCE DRAWINGS HE548643-ARC-HDG-SZ-GN_000-DR-D-3075-3097

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PLAN AND SECTION FOR EXISTING CULVERT 6 CH 4+300

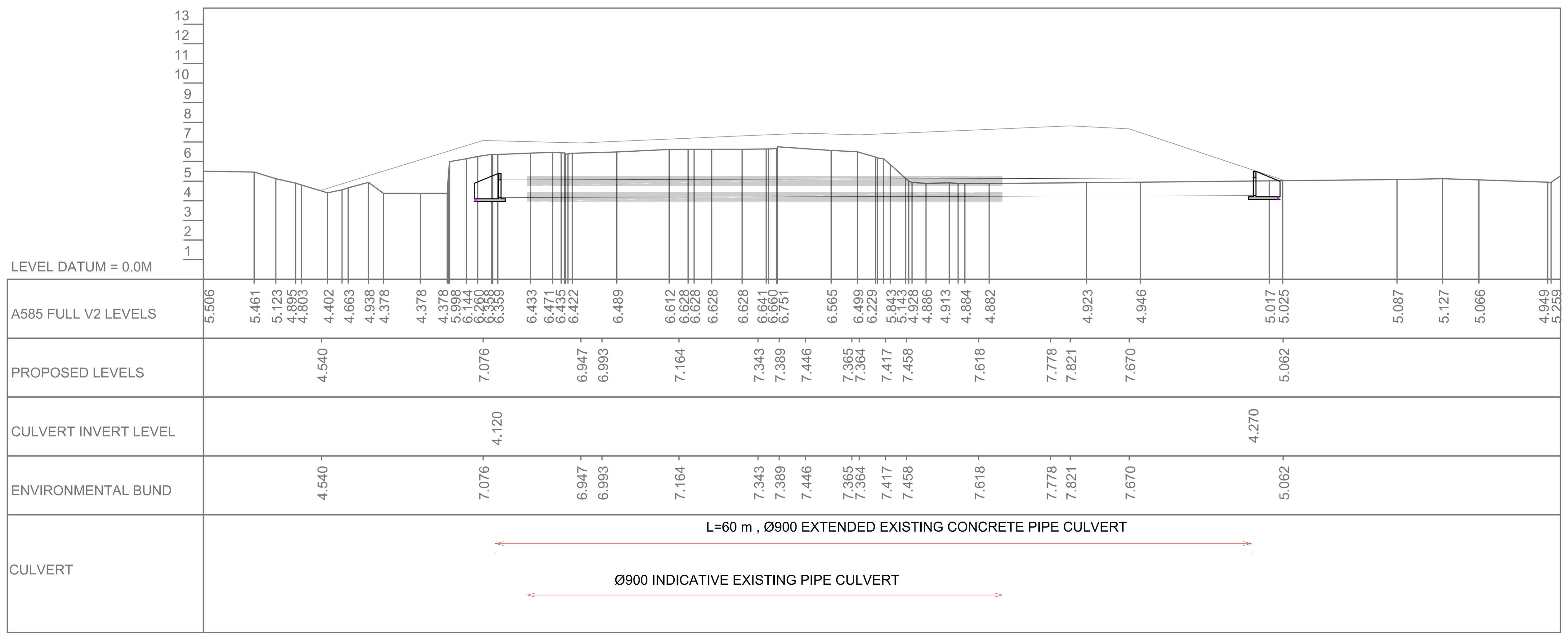
Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1

Drawing number HE PIN | Originator | Volume | Location | Type | Role | Number
HE548643-ARC-HDG-SZ-GN_000-DE-D-3073

100mm on Original

Print Date: 2018-07-13 22:47:44

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg



SECTION 1

Rev	Status	Date	Description	Drawn	Chck'd	Apprv'd
P02	PD	10JULY18	PRELIMINARY DESIGN	LA	AC	NH
P01	PD	22DEC17	PRELIMINARY DESIGN	LA	AC	NH

NOTES

1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE.
2. CONCRETE STONE PITCHING TO BE USED FOR DITCH EROSION PROTECTION. FOR DETAILS SEE DRAWING HE548643-ARC-HDG-SZ-GN_000-DE-D-3067
3. EARTHWORKS TO BE VERIFIED ON SITE .
4. MAMMAL SHELF AND OTTER PASS SHALL BE PROVIDED AT 1 IN 50 YEAR RETURN PERIOD FLUVIAL FLOODING
5. ALL CULVERTS ARE TO BE FORMED FROM PRE-CAST CONCRETE PIPES, AND TO BE ARCHED TO ACCOMMODATE DIFFERENTIAL SETTLEMENT, REFER TO STRUCTURAL OPTIONS REPORT.
6. LENGTH OF EXISTING CULVERT IS INDICATIVE , TO BE VERIFIED WITH FURTHER CCTV AND ASSET SURVEY DURING STAGE 5. NO CCTV INFORMATION AVAILABLE AT THIS STAGE , REFER TO EXISTING DRAINAGE AND SITE CLEARANCE DRAWINGS HE548643-ARC-HDG-SZ-GN_000-DR-D-3075-3097

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing title: PLAN AND SECTION FOR EXISTING CULVERT 7 CH 4+350

Status	S3 - PRELIMINARY DESIGN
Revision	P02
Scale	1:200
Date	10JULY18
Drawn By	L.ARAR
Checked By	A.COPE
Approved By	N.HENDERSON
Original Size	A1
Drawing number	HE548643-ARC-HDG-SZ-GN_000-DE-D-3074

100mm on Original

Print Date: 2018-07-13 22:48:12

File Path: C:\Users\ski00451\ARCADIS\UA009921 - A585 Windy Harbour to Skippool - PCF Stage 3 - Dig_Eng_Shared_Models\Culvert_Plan_section V03.dwg

Appendix H – Water quality assessments

MEMO

ARCADIS Design & Consultancy for natural and built assets

SUBJECT
A585 Windy Harbour to Skippool Highway Drainage Outfalls Assessment

DATE
12 December 2017

DEPARTMENT
Water Management and Resilience

COPIES TO
[redacted]

TO
[redacted]

PROJECT NUMBER
10013463

FROM
[redacted]

Author	[redacted]	[redacted]
Checker		
Approver		

1. Introduction

An assessment has been undertaken to quantify the potential impacts of the discharge of routine runoff from the Scheme to receiving watercourses, namely the Horsebridge Dyke, the Main Dyke and the Pool Foot Creek. The Highways Agency Water Risk Assessment Tool (HAWRAT) has been used, as prescribed in Method A of the Design Manual for Roads and Bridges Volume 11, Section 3, Part 10, - Road Drainage and the Water Environment (DMRB HD45/09).

In accordance with the methodology a tiered approach to the assessment has been followed, with results reported at each step. Proposed outfalls have been assessed individually and cumulatively:

- for soluble pollutants where outfalls discharge within 1km along a river reach
- for sediment – bound pollutants where outfalls discharge within 100m along a river reach

2. Input Data

The HAWRAT requires data that have been collected from a number of sources, briefly summarised below and document in more detail in the accompanying A585 HAWRAT Input Data document:

- Climatic region: Cold/Wet and Standard Annual Average Rainfall: Warrington
- Q95 flow – derived from Centre of Ecology and Hydrology LowFlow software
- BFI – extracted for relevant catchments from the FEH web-service
- Designated Areas – searched online Nature on the Map
- Water Hardness – no local data available so a conservative assumption (Low) was adopted
- River Width – measured blue line thickness on OS mapping

3. Individual Outfall Assessment Results

The table below summarises the results of the individual outfall assessments.

Outfall No. & Receiving Watercourse	Step 1	Step 2	Step 3	Comments
Ca.1 Horsebridge Dyke	Runoff Fails Toxicity Test	Copper (0.04ug/l) and Zinc (0.13ug/l) PASS. Sediment accumulating: Yes (0m/s), Extensive: No (24).	No mitigation required. N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment – Pass with alert D/S Protected Area
Ca.2 Horsebridge Dyke	Runoff Fails Toxicity Test	Copper (0.03ug/l) and Zinc (0.10ug/l) PASS Sediment accumulating: Yes (0.01m/s), Extensive: No (27).	No mitigation required. N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment – Pass with alert D/S Protected Area
Ca.3 Main Dyke	Runoff Fails Toxicity Test	Copper (0.03ug/l) and Zinc (0.12ug/l) PASS Sediment accumulating: Yes (0.02m/s), Extensive: No (45).	No mitigation required. N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment – Pass with alert D/S Protected Area
Ca.4 Main Dyke	Runoff Fails Toxicity Test	Copper (0.09ug/l) and Zinc (0.31ug/l) PASS. Sediment accumulating: Yes (0.03m/s), Extensive: Yes (121).	Sediment accumulating yes (0.03m/s), extensive no (99).	Stage 1: Fail Stage 2: Fail (sediments only). Stage 3: Metals – Pass Sediment – Pass
Ca.5 Main Dyke	Runoff Fails Toxicity Test	Copper (0.07ug/l) and Zinc (0.25ug/l) PASS. Sediment accumulating: Yes (0.03m/s), Extensive: No (99).	No mitigation required. N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment - Pass
Ca.5b Main Dyke	Runoff Fails Toxicity Test	Copper (0.01ug/l) and Zinc (0.04ug/l) PASS. Sediment accumulating: Yes (0.03m/s), Extensive: No (16)	No mitigation required. N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment – Pass
Ca.6	Runoff Fails	Copper (0.85ug/l) and Zinc (2.89ug/l) FAIL.	Copper (0.57ug/l) and	Stage 1: Fail

Pool Foot Creek	Toxicity Test	Sediment accumulating: Yes (0.03m/s), Extensive: Yes (455).	Zinc (1.94ug/l) PASS. Sediment accumulating (0.03m/s), extensive no (91).	Stage 2: Fail Stage 3: Metals – Pass Sediment – PASS with alert D/S Protected Area
Ca.7 Pool Foot Creek	Runoff Fails Toxicity Test	Copper (0.79ug/l) and Zinc (2.69ug/l) FAIL Sediment accumulating: Yes (0.03m/s), Extensive: Yes (409).	Copper (0.55ug/l) and Zinc (1.89ug/l) PASS. Sediment accumulating (0.03m/s), extensive no (98).	Stage 1: Fail Stage 2: Fail Stage 3: Metals – Pass Sediment – PASS with alert D/S Protected Area
Ca.8 Main Dyke	Runoff Fails Toxicity Test	Copper (0.00ug/l) and Zinc (0.01ug/l) PASS. Sediment accumulating: Yes (0.10m/s), Extensive: No (2)	N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment - Pass

The results indicate that discharges from drainage catchments 1, 2 and 3 all pass at Step 2 for both solubles and sediments, albeit with an alert for sediments to flag that there is a protected area (the Wyre Estuary SSSI) downstream of these outfalls. Water quality treatment measures are not therefore required at these outfalls.

The outfall discharging catchment 4 fails at Step 2 for sediments, with the results indicating the potential for extensive sediment accumulative downstream of the outfall. Settlement of sediments is therefore required, with 18% settlement needed to achieve a PASS at Step 3. A wetland with a vortex grit separator is proposed at this location. Data presented in HD33/16 for the treatment efficiencies of various treatment system types shows that vortex grit separators can achieve 40% removal of suspended solids and the removal percentage for wetlands is 60%. These proposed treatment measures would therefore comfortably provide the level of settlement necessary at this outfall.

The outfalls draining catchments 5 and 5B both pass at Step 2 for solubles and sediment and whilst no treatment measures are required the drainage design includes for a wetland and vortex grid separator.

Outfalls from catchments 6 and 7 both discharge to the Pool Foot Creek, which is a small watercourses that drains a corresponding small catchment areas, hence the available dilution is limited. As a result both of these outfalls fail at Step 2 for both solubles and sediment and treatment/settlement measures are required. 33% treatment for solubles and 80% settlement for suspended solids is required at outfall 6 and 30% treatment for solubles and 76% for settlement for suspended solids is necessary at outfall 7. Wetland and vortex grid separator systems are proposed at both outfalls. In combination these measures offer settlement efficiencies of up to 100% (60%/40% respectively) and soluble treatment efficiencies of up to 65% for Zinc and 30% for Copper. These proposed treatment measures would therefore provide the levels of settlement and solubles reduction necessary at these outfalls.

The outfall draining catchment 8 passes at Step 2 for solubles and sediment and no treatment measures are required, nor are proposed at this outfall.

4. Cumulative Outfall Assessments

The table below summarises the results of the cumulative outfall assessments undertaken.

Outfalls	Step 1	Step 2	Step 3	Comments
Ca.1 and Ca.2	Runoff Fails Toxicity Test	Copper (0.06ug/l) and Zinc (0.22ug/l) PASS. Sediment accumulating: Yes (0.00m/s), Extensive: No (43)	N/A	Stage 1: Fail Stage 2: Metals – Pass Sediment – Pass with alert D/S Protected Area
Ca.4, Ca.5 and Ca.5B	Runoff Fails Toxicity Test	Copper (0.16ug/l) and Zinc (0.57ug/l) PASS	N/A	Stage 1: Fail Stage 2: Metals - Pass
Ca.6 and Ca.7	Runoff Fails Toxicity Test	Copper (1.29ug/l) and Zinc (4.31ug/l) FAIL. Sediment accumulating: Yes (0.03m/s), Extensive: Yes(865)	Copper (0.62ug/l) and Zinc (2.07ug/l) PASS Sediment accumulating: Yes (0.03m/s), Extensive: Yes (95)	Stage 1: Fail Stage 2: Fail Stage 3: Metals – Pass Sediment – PASS with alert D/S Protected Area

The results indicate that the cumulative discharges from drainage catchments 1 and 2 passes at Step 2 for both solubles and sediments, albeit with an alert for sediments to flag that there is a protected area (the Wyre Estuary SSSI) downstream of these outfalls. Water quality treatment measures are not therefore required at these outfalls.

The cumulative outfall discharging catchments 4, 5 and 5B pass at Step 2 for solubles and sediment and whilst no treatment measures are required the drainage design includes a wetland for catchments 4 and 5.

Cumulative outfalls from catchments 6 and 7 discharge to the Pool Foot Creek, as above it is a small watercourse that drains the two catchment areas. The cumulative assessment shows that Step 2 is failed for both solubles and sediment and treatment/settlement measures are required. 52% treatment for solubles and 89% settlement for suspended solids is required for the cumulative outfall. Wetland and vortex grid separator systems are proposed at both outfalls. In combination these measures offer settlement efficiencies of up to 100% (60%/40% respectively) and soluble treatment efficiencies of up to 65% for Zinc and 30% for Copper. These proposed treatment measures would therefore provide levels of settlement necessary at these outfalls. However, as we are approaching or exceeding our soluble treatment efficiencies we would recommend that more detailed assessment using Method B is undertaken or further measures in the treatment train are investigated.

Appendix I – Accidental spillage containment assessments

Probability calculation Summary

$P_{inc} =$ $P_{SPL} \times P_{POL}$

Outfall location	P_{SPL}	P_{POL}	P_{inc}	%
1	0.000322085	0.6	0.00019325	0.019
2	0.000345008	0.6	0.00020701	0.021
3	0.002382296	0.6	0.00142938	0.143
4	0.00050705	0.6	0.00030423	0.030
5	0.004037841	0.6	0.00242270	0.242
5b	0.000361461	0.6	0.00021688	0.022
6	0.000198486	0.6	0.00011909	0.012
7	0.000247538	0.6	0.00014852	0.015
8	-	0.6	-	
9	0.000113291	0.6	0.00006797	0.007

Where P_{inc} is less than 1%, no further spillage prevention measures are required to reduce the risk of a serious pollution incident.

All of our outfalls therefore 'Pass', with no need for spillage prevention measures.

Appendix J – Technical note (TN22) – Drainage CCTV asset and condition survey review

ARCADIS Design & Consultancy for natural and built assets

working on behalf of

highways england

Technical Note 22

Project	**A585 Windy Harbour to Skippool**	Date	23 MAY 2018
Subject	**Drainage CCTV Asset and Condition Survey Review**	Ref	**HE548643-ARC-HDG-A585-TN-D-3022 Version 1.0**

Author [redacted]

Table of Contents

Prepared by	[redacted]	Date	22/05/2018
Checked by	[redacted]	Date	23/05/2015
Approved by		Date	

Revision Status	Amendments	Date
V 1.0	First Issue	27/06/2018

1 Introduction

1.1 Background

1.1.1 During the Preliminary Design (Stage 3) existing as-built records and drainage data for the existing A585 trunk road has been obtained from Highways England Drainage Data Management System (HADMMS).

1.1.2 As-built drainage data has also been received from Enterprise Mouchel (Area 13) for the newly constructed Windy Harbour Junction (Drawing number: 780003/501z & 502z).

1.1.3 No data has been received from Lancashire County Council (LCC) for the local drainage networks which connect to the existing A585 trunk road. LCC stated during a walk over survey on the 30/11/2017 that no formal data is available.

1.1.4 This information has been used to determine the existing drainage collector, carrier systems and outfalls serving the existing A585 within the study area.

1.1.5 From a desk top gap analysis study of the available data it became clear that additional asset survey would be required to fill the gaps in the missing asset data.

1.2 Survey requirements

1.2.1 During the desk top study existing drainage gap analysis plans (CCTV asset and condition survey requirements) where produced to identify areas where addition asset and condition data was required. These areas where split into three categories on the plans (document numbers HE548643-ARC-HDG-A585-DR-D-3301 to 3312):

- Existing drainage to be removed – CCTV asset and condition survey not required;
- Existing drainage to be retained – CCTV asset and condition survey required; and
- Existing drainage to be removed – asset survey required (no CCTV condition survey).

1.3 Survey length

1.3.1 The existing drainage gap analysis plans estimated that 8.8km of existing drainage needed be surveyed, of which:

1. 6.3km is categorised as “existing drainage to be retained – CCTV asset and condition survey required”; and
2. 2.5km is categorised as “existing drainage to be removed – asset survey required (no CCTV condition survey)”.

1.4 De-scoped works

1.4.1 The proposed CCTV asset and condition survey works were de-scoped by Highway England on the 18/02/2018. The descoping was due the original survey programme taking 6 weeks which would of meant it clashing with road closes being but in place for another Highways England Scheme. In addition, further survey information was received from the maintainer prior to the works commencing.

1.4.2 The survey was descoped on the understanding that the remaining drainage asset would be surveyed at design stage 5 to inform the de-trunking works.

1.4.3 The revised descoped plans were issued to Highways England on the 19/02/2018.

1.5 Contractor CCTV Survey

1.5.1 The risk of not having data for 6.3km of drainage asset was raised via an Early Warning Notice and entered onto the Project Risk Register. As a result, Highways England instructed the CCTV asset and condition survey to be undertaken during Stage 3.

1.5.2 This Technical Note captures the results of this further additional survey and its impact on the current design.

2 Survey Data Review

2.1 Survey data specification

2.1.1 A CCTV Asset and Condition Specification - Appendix 90/1 (document number HE548643-ARC-HDG-A585-SU-D-3000) along with a Schedule or Rates (SoR) was issued to Highways England in October 2017. This specification outlined the scope of works, pre-cleansing, traffic management issues, and the required deliverables.

2.2 Information received

2.2.1 The original survey programme supplied by Highways England's CCTV asset and condition supplier Interserve stated that the survey works would start in 16/02/2018 and would be completed by the end of 09/03/2018 (4weeks). However, the survey was delayed, by 10 day and started on the 26/02/2018 and finished on 23/03/2018, with the final report received on 30/04/2018

2.2.2 The CCTV data was issued to Arcadis via WeTransfer and Table A in Appendix A summarises the CCTV asset and condition data.

2.3 Feedback on received data

2.3.1 4 No. files were received in the WeTransfer, these being:

- 1no. Access database file;
- 1no. drawing AutoCAD file;
- 1no. PDF file of the drawings; and
- 1no. CCTV report

2.3.2 The survey information received is generally in compliance with the specification. However, the following deliverables required by the specification have not been provided:

- WinCan inspection report;
- Detailed report on departures from drainage drawings;
- Marked up drawings and AutoCAD files showing the location of major defects; and
- Marked up drawings and AutoCAD files showing the defect mitigation recommendations.

2.4 Outstanding data

2.4.1 The SoR estimate 6.3km of existing pipework needed CCTV asset and condition survey and 2.5km required asset survey only (total 9km).

2.4.2 We have received 6.3km of data, of which some of the data is outside of the scope of works as shown on a set of hand marked up plans in Appendix A. The plans have been highlighted to show:

- No CCTV asset and condition survey available (yellow highlight);
- CCTV asset and condition survey available (Blue highlight); and
- CCTV asset and condition survey in complete (Green highlight).

2.4.3 Other elements break down as below:

- Estimated chambers = 147, surveyed = 131

- Estimated gullies = 176, surveyed = 211

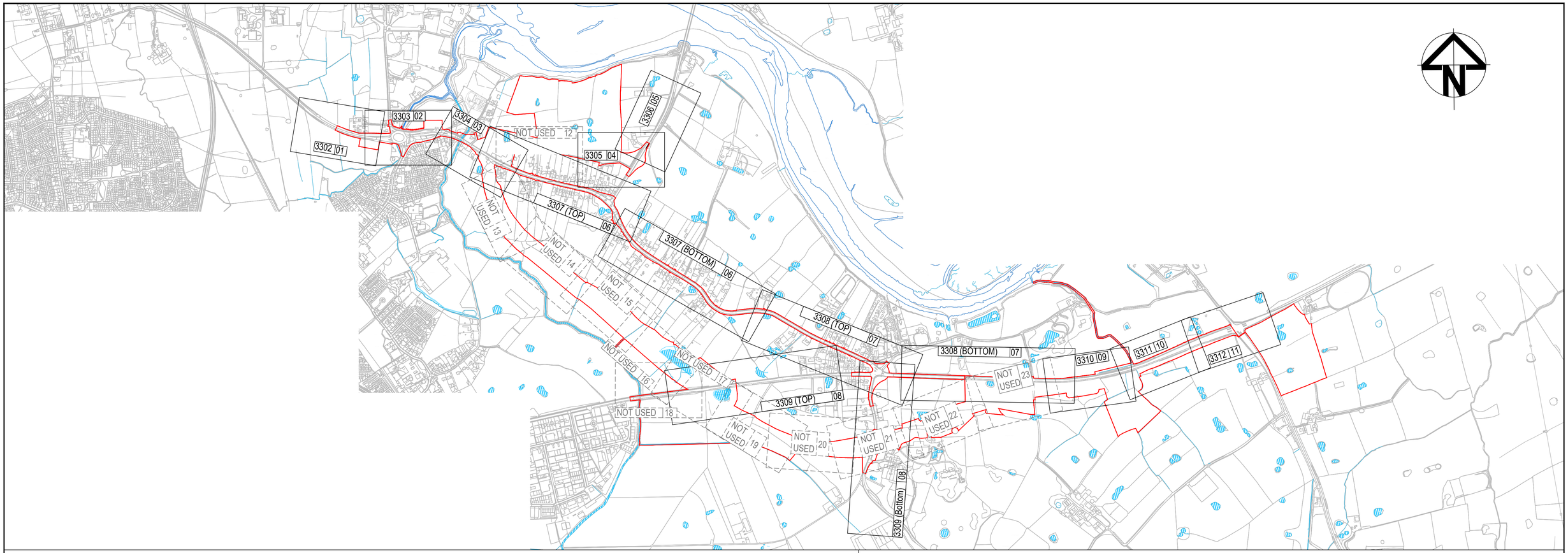
2.4.4 Consequently, there is still a minimum of 2.5km of outstanding data, based on the de-scoped survey works.

2.5 Conclusion

The received CCTV asset and condition data helps clarify some of the existing drainage assets and their condition, but there are still large areas were the data is incomplete or missing and we will have to make assumptions to fill in the gaps

The deliverables are partially in compliance with the specification.

Appendix A – Hand marked up CCTV plans



DRAINAGE LEGEND :

- PROPOSED REDLINE BOUNDARY
- 225 Ø — EXISTING DRAINAGE TO BE REMOVED - CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- 225 Ø — EXISTING DRAINAGE TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- 225 Ø — EXISTING DRAINAGE TO BE RETAINED - CCTV ASSET AND CONDITION SURVEY REQUIRED
- 225 Ø — EXISTING DRAINAGE TO BE REMOVED - ASSET SURVEY REQUIRED (NO CCTV CONDITION SURVEY)
- EXISTING DRAINAGE GULLY POT WITH CONNECTIONTO BE REMOVED - CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- EXISTING DRAINAGE GULLY POT WITH CONNECTION TO BE RETAINED - CCTV ASSET AND CONDITION SURVEY REQUIRED
- EXISTING DRAINAGE GULLY POT WITH CONNECTION TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE/CATCHPITTO BE REMOVED - CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE/CATCHPIT TO BE RETAINED - CCTV ASSET AND CONDITION SURVEY REQUIRED
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE/CATCHPIT TO BE REMOVED - ASSET SURVEY REQUIRED (NO CCTV CONDITION SURVEY)
- M1A-001/C1A-001 — EXISTING DRAINAGE MANHOLE\CATCHPIT TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED

- EXISTING DRAINAGE TO BE RETAINED -CCTV ASSET AND CONDITION SURVEY NOT REQUIRED
- NO EXISTING DRAINAGE DATA AVAILABLE - LOCATE EXISTING DRAINAGE ASSETS AND UNDERTAKE CCTV ASSET AND CONDITION SURVEY
- Pond — EXISTING WATERBODIES
- ASSUMED EXISTING HEADWALL / OUTFALLL LOCATION
- PROPOSED ROAD LAYOUT
- ORDNANCE SURVEY
- EXISTING ROAD

3311 | 10 — SHEET NO. / DRAWING NO.

DRAINAGE GENERAL NOTES :

1. ALL PIPE SIZES ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS STATED OTHERWISE.
2. WRITTEN SCALES (EG. 1:1000, 1:500, ETC.) APPLY TO DRAWINGS AT A1 PAPER SIZE UNLESS NOTED OTHERWISE.
3. DO NOT SCALE DIRECTLY FROM DRAWINGS, USE FIGURED DIMENSIONS ONLY.
4. REFER TO CCTV ASSET SPECIFICATION HE-548643-ARC- HDG-A585-RP-D-3037.
5. CCTV ASSET AND CONDITION SURVEYS ARE TO BE UNDERTAKEN ON ALL IDENTIFIED AND UNIDENTIFIED DRAINAGE ASSET AS HIGHLIGHTED ON THESE PLANS.
6. SHEET NO. 12 TO 23 NOT TO BE REFERRED FOR THIS PACKAGE.

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

LOCATION PLAN

Client: highways england

ARCADIS Design & Consultancy for natural and built assets
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) KEY PLAN

Status	PRELIMINARY DESIGN
Revision	P02
Scale	NTS
Date -	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN I Originator
	UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume I Location I Type I Role I Number
	HE548643-ARC-HDG-A585-DR-D-3301

100mm on Original

Print Date:

File Path:

A585 AMOUNDERNESS WAY

NO CCTV Asset & condition survey available

CCTV Asset & condition survey available

CCTV Asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House 34 York Way London N1 9AB
Coordinating office The Surrey Research Park 10 Medawar Road Guildford GU2 7AR Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 1 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N HENDERSON
Project No	UA008015
HA PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3302

100mm on Original

Print Date:

File Path:

DRAINAGE ASSETS ON SKIPPOOL ROAD (B5412) TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

B5412 SKIPPOOL ROAD

STRUCTURAL CONDITION SURVEY REQUIRED, METHODOLOGY TO BE CONFIRMED WITH SPECIALIST SUPPLIER

A585 BRECK ROAD

A588 BRECK ROAD

OUTFALL CATCHMENT-02A DETAILS TBC

OUTFALL CATCHMENT-01A DETAILS TBC

OUTFALL CATCHMENT-02B DETAILS TBC

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3302

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3304

E 440600

E 440500

200 300 400 500

No CCTV asset & condition survey available

CCTV Asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS

Registered office: Arcadis House, 34 York Way, London N1 9AB

Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 2 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN ! Originator: UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume ! Location ! Type ! Role ! Number: HE548643-ARC-HDG-A585-DR-D-3303

100mm on Original

Print Date:

File Path:

OLD MAINS LANE

A585 MAINS LANE

Main Dyke

OUTFALL CATCHMENT-03A DETAILS TBC

OUTFALL CATCHMENT-04A DETAILS TBC

G3A/TBC

G4A/TBC

C4A-035

G4A-034

G4A-032

G4A-030

G4A-028

G4A-026

G4A-024

G4A-022

C4A-021

G4A-019

G4A-017

G4A-015

C4A-014

G3A-051

G3A-031

G3A-029

G3A-027

G3A-025

150 Ø

225 Ø

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3303

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3307 (TOP)

500

600

700

008 Pond

No CCTV asset & condition survey available

CCTV & asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR
Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 3 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date -	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N HENDERSON
Project No	HA PIN UA008015 HE548643
Originator	ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number

HE548643-ARC-HDG-A585-DR-D-3304

100mm on Original

Print Date:

File Path:

Pond

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3306

E 440530

A588 SHARD ROAD

DRAINAGE ASSETS ON A588 TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

E 440400

No CCTV asset & condition Survey available

CCTV asset & condition survey available

CCTV asset & condition Survey is incomplete

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3307 (TOP)

Pond

Pond

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chk'd	Appr'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

Print Date:

File Path:

Notes

1 FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

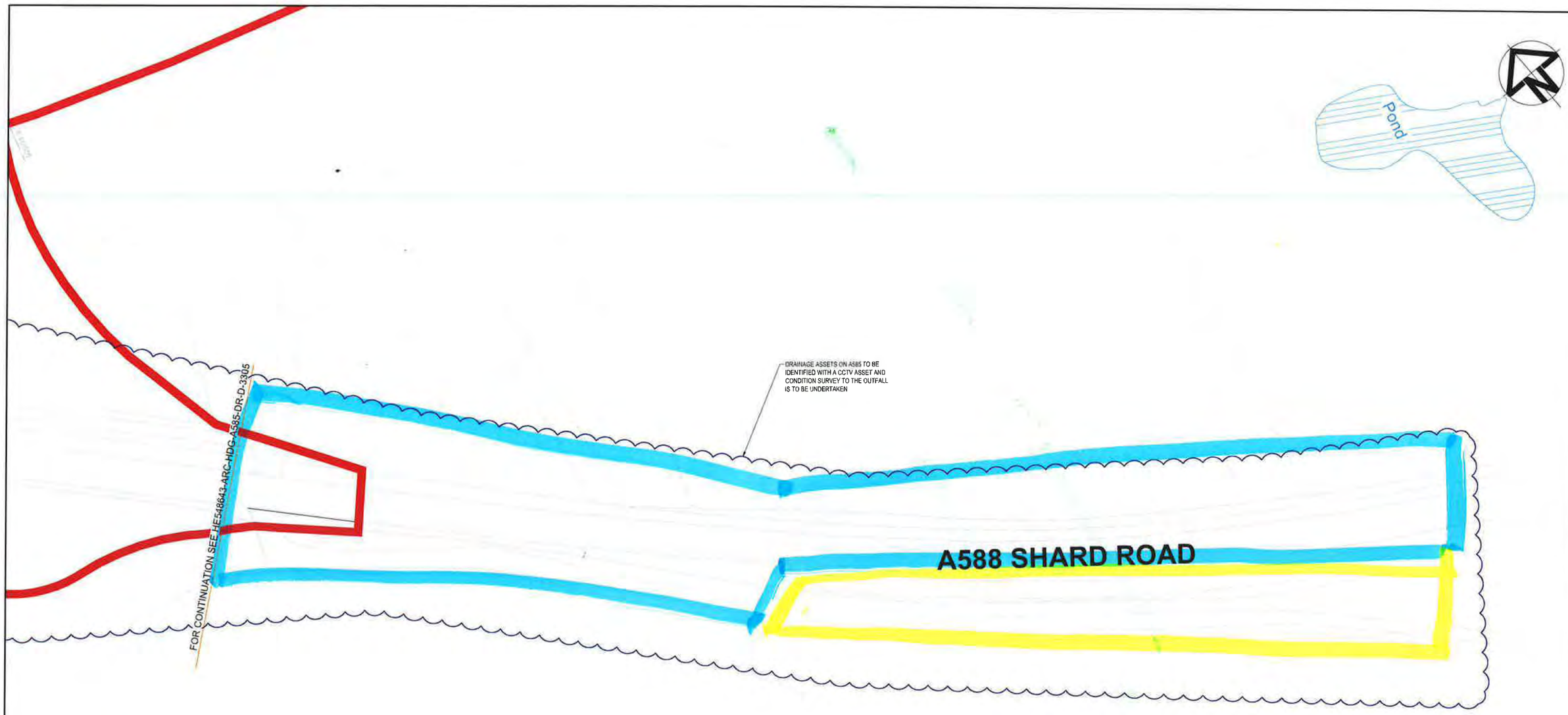
Client: highways england

ARCADIS
Registered office
Arcadis House
34 York Way
London
N1 9AB
Coordinating office
The Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel +44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL
STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 4 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N. HENDERSON
Project No	HA PIN | Originator: UA008015 HE548643 ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number: HE548643-ARC-HDG-A585-DR-D-3305



NO CCTV asset & condition Survey available

CCTV asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes:

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS

Registered office: Arcadis House 34 York Way London N1 9AB

Coordinating office: The Surrey Research Park 10 Medawar Road Guildford GU2 7AR Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

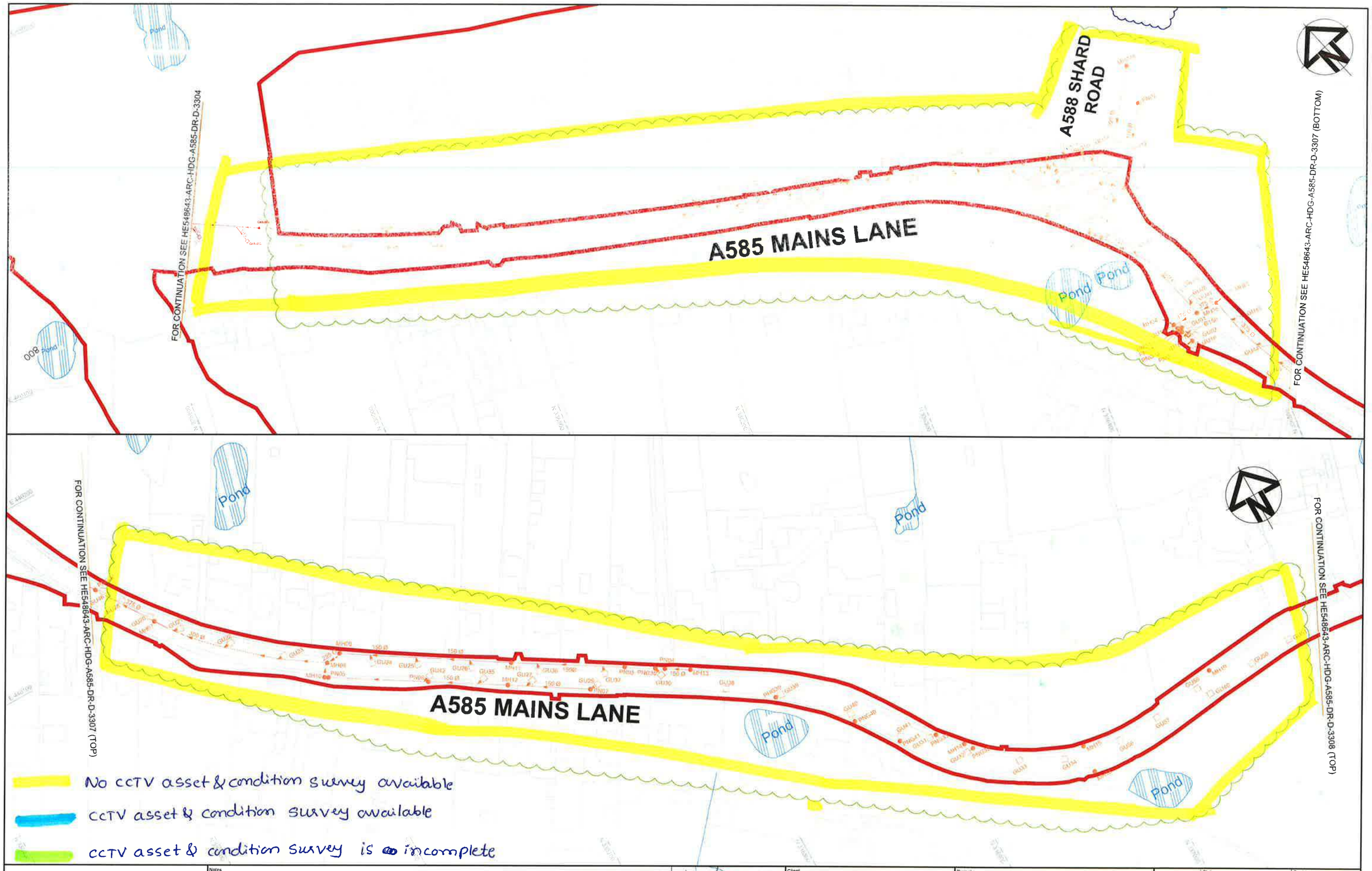
Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 5 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date -	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N HENDERSON
Project No	UA008015
HA PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3306
Volume | Location	
| Type | Role | Number	

100mm on Original

Print Date:

File Path:



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

100mm on Original

Print Date:

File Path:

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

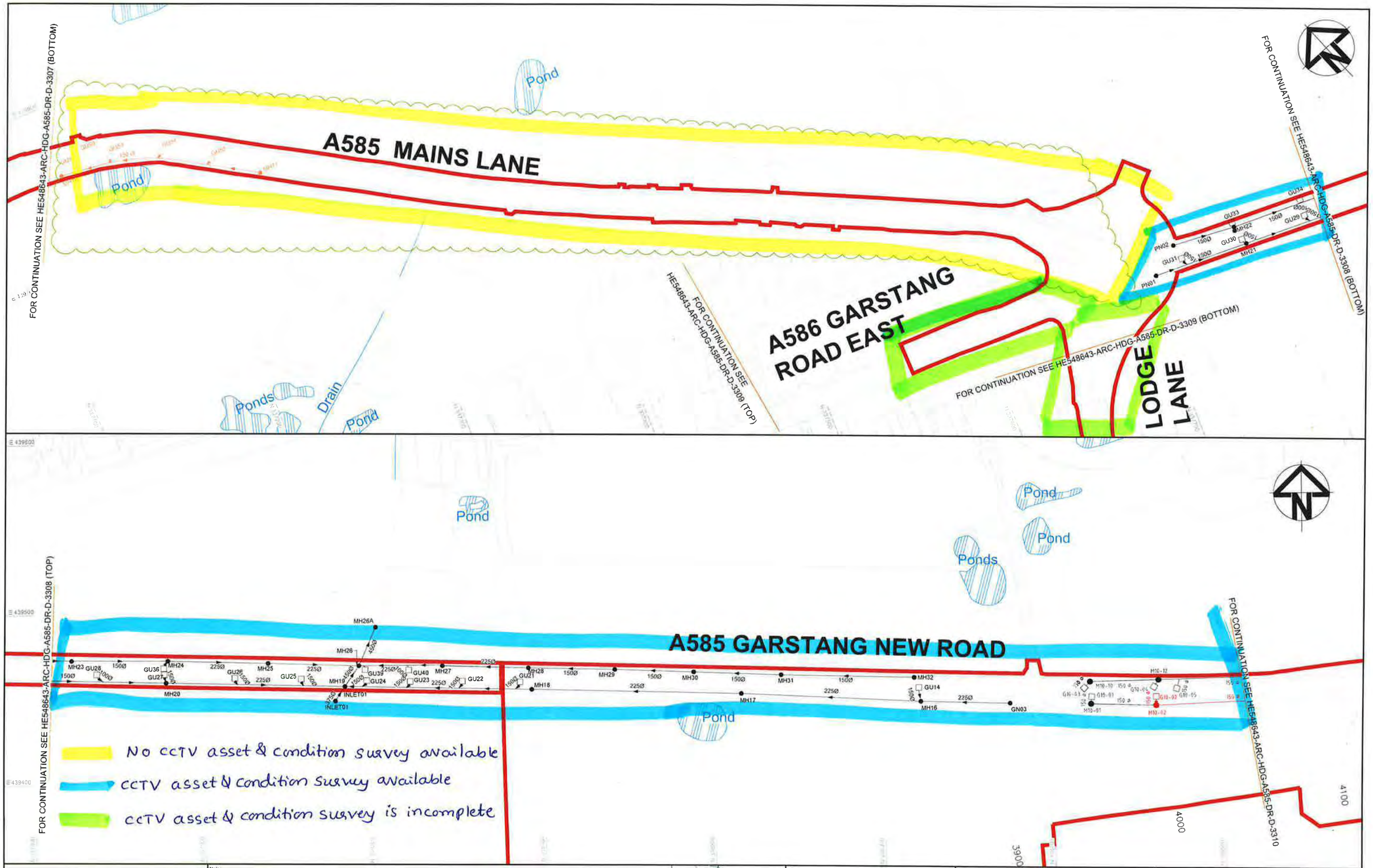
ARCADIS
Registered office: Arcadis House 34 York Way London N1 9AB
Coordinating office: The Surrey Research Park 10 Mediawrr Road Guildford GU2 7AR Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 6 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:1000
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A.COPE
Approved By	N.HENDERSON
Project No.	UA008015
Originator	HE548643 ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3307

Volume | Location | Type | Role | Number



Rev	Status	Rev Date	Purpose of revision	Drawn	Chk'd	Appr'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS

Registered office: Arcadis House 34 York Way London N1 9AB

Coordinating office The Surrey Research Park 10 Medawar Road Guildford GU2 7AR Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 7 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:1000
Date	21FEB2018
Drawn By	SURESH G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN / Originator: UA006015 HE548643 ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number: HE548643-ARC-HDG-A585-DR-D-3308

100mm on Original

Print Date:

File Path:

A586 GARSTANG ROAD EAST

Pond

Pond

Pond Extension

Pond

2200

2300

2400

DRAINAGE ASSETS ON GARSTANG ROAD TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (TOP)

Pond

3100

B5260 LODGE LANE

3200

NO CCTV asset & condition survey available

CCTV asset & condition survey available

CCTV asset & condition survey is incomplete

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (TOP)

PN01

PN02

GU31

1500Ø

1500Ø

GU30

GU22

1500Ø

GU23

1500Ø

GU29

1500Ø

GU24

DRAINAGE ASSETS ON LODGE LANE TO BE IDENTIFIED AND A CCTV ASSET AND CONDITION SURVEY TO THE OUTFALL IS TO BE UNDERTAKEN

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3308 (BOTTOM)

Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Approv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

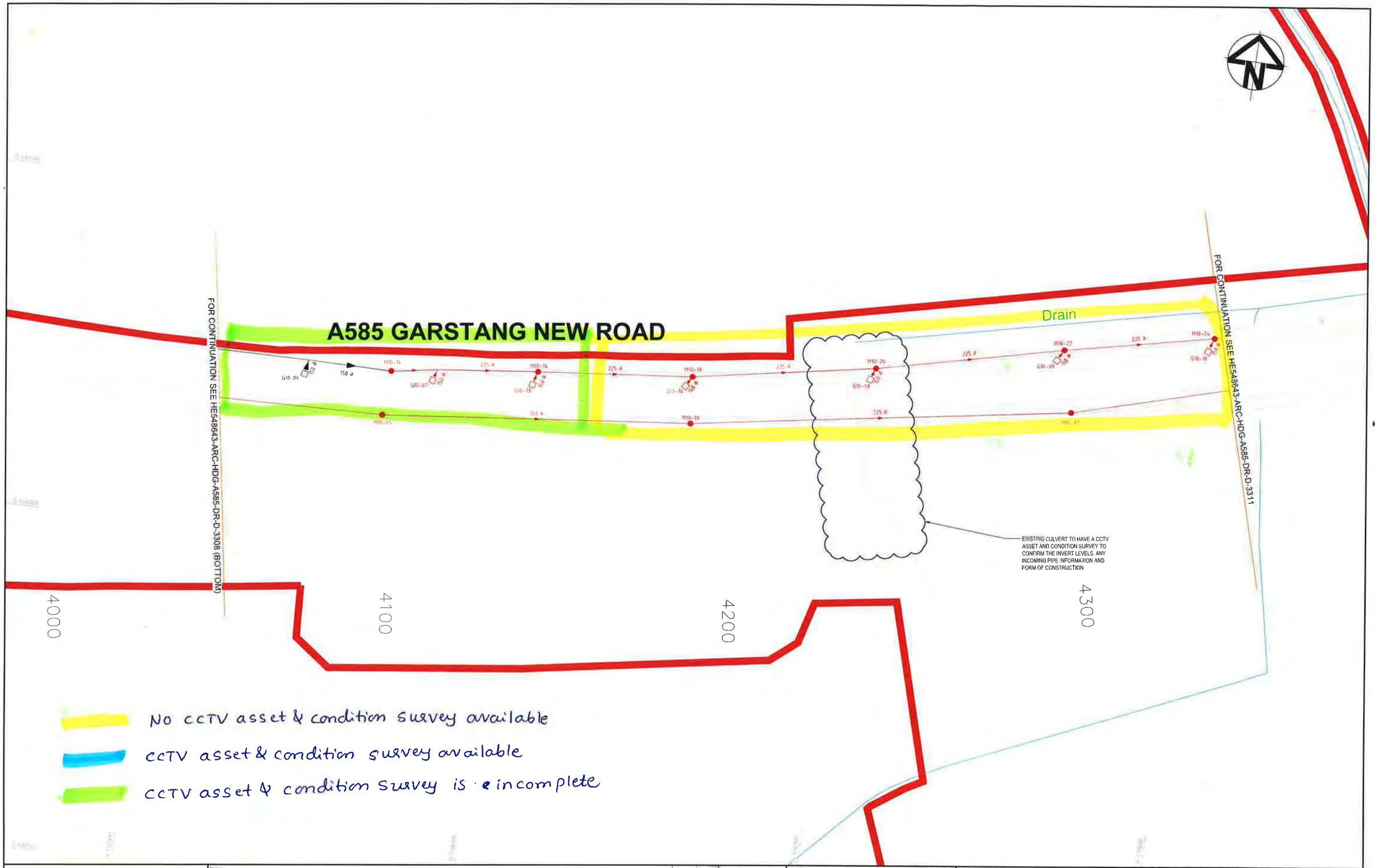
Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 8 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:1000
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No	HA PIN / Originator ARC
UA008015	HE548643
Original Size	A1
Drawing number	Volume / Location / Type / Role / Number
	HE548643-ARC-HDG-A585-DR-D-3309

100mm on Original

Print Date:

File Path:



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Appr'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes
1 . FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office
Arcadis House
34 York Way
London
N1 9AB
Coordinating office
Tne Surrey Research Park
10 Medawar Road
Guildford GU2 7AR
Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 9 OF 11

Status	PRELIMINARY DESIGN	Revision	P02
Scale	1 500	Date -	21FEB2018
Drawn By	SURESH G		
Checked By	A COPE		
Approved By	N HENDERSON		
Project No	HA PIN / Originator	Original Size	A1
UA008015	HE548643 / ARC		
Drawing number	Volume / Location / Type / Role / Number		

HE548643-ARC-HDG-A585-DR-D-3310

100mm on Original

Print Date:

File Path:

A585 GARSTANG NEW ROAD

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3310

FOR CONTINUATION SEE HE548643-ARC-HDG-A585-DR-D-3312

EXISTING CULVERT TO HAVE A CCTV ASSET AND CONDITION SURVEY TO CONFIRM THE INVERT LEVELS, ANY INCOMING PIPE INFORMATION AND FORM OF CONSTRUCTION

EXISTING CULVERT TO HAVE A CCTV ASSET AND CONDITION SURVEY TO CONFIRM THE INVERT LEVELS, ANY INCOMING PIPE INFORMATION AND FORM OF CONSTRUCTION

Outfall Catchment - G10 & G11A

Pond

Pond

Pond

Drain

4400

4500

4600

4700

NO CCTV asset & condition survey available

CCTV asset & condition survey available

CCTV asset & condition survey is incomplete

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes

1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel: 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 10 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH G
Checked By	A COPE
Approved By	N HENDERSON
Project No.	UA008015
PIN	HE548643
Originator	ARC
Original Size	A1
Drawing number	HE548643-ARC-HDG-A585-DR-D-3311

Volume | Location | Type | Role | Number

100mm on Original

Print Date:

File Path:

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chckd	Apprvd
P02	PD	21FEB2018	REDUCED SURVEY SCOPE	SG	AC	NH
P01	PD	26OCT2017	PRELIMINARY DESIGN	SK	AC	NH

Notes
1. FOR NOTES AND LEGENDS REFER DRAWING NO :HE548643-ARC-HDG-A585-DR-D-3301
2. ALL GULLY OUTLET PIPES ARE 150mm DIAMETER UNLESS SPECIFIED

LOCATION PLAN

Client: highways england

ARCADIS
Registered office: Arcadis House, 34 York Way, London N1 9AB
Coordinating office: The Surrey Research Park, 10 Medawar Road, Guildford GU2 7AR, Tel 44 (0)1483 803 000

Project: A585 WINDY HARBOUR TO SKIPPOOL STAGE - 3 PRELIMINARY DESIGN

Drawing title: EXISTING DRAINAGE GAP ANALYSIS PLANS (CCTV ASSET AND CONDITION SURVEY REQUIREMENTS) SHEET 11 OF 11

Status	PRELIMINARY DESIGN
Revision	P02
Scale	1:500
Date	21FEB2018
Drawn By	SURESH.G
Checked By	A. COPE
Approved By	N. HENDERSON
Project No.	HA PIN HE548643 / Originator ARC
Original Size	A1
Drawing number	Volume | Location | Type | Role | Number: HE548643-ARC-HDG-A585-DR-D-3312

100mm on Original

Print Date:

File Path:

Appendix K – Maintenance operations

DRAINAGE MAINTENANCE SCHEDULE										
Ref	**Group Item**	**Tasks**	**Frequency**	**Traffic Management Measures**	**Assumed Means of Safe Access**	**Assumed Safe Method of Maintenance Work**	**Impact on Day-to-Day Operations**	**Impacts on Current Maintenance Activities**	**Scheme Specific Safety Measures and Risks**	**Remarks**
1	Surface water drainage systems	Inspection, litter/debris removal for drainage elements at ground level, including: gullies, combined kerb drain units, Linear drain units, Grated "u" channels, all chambers.	Regular	Partial lane closures for underpasses and roads where no footpaths exist.	• Access is via the existing road network. Operate under lane closure. • Avoid entry to chamber where possible. (Confined space entry)	• All operations are carried out above ground. • Conduct as part of the general highways maintenance for the scheme	Some disruption to road users during lane closure.	Increased. More drainage elements and variety in the area.	• Working near live traffic / NMUs. • Surface water channels / Combined drainage and kerb units and linear drainage systems are prone to rapid build-up of silt and debris in flat areas.	• Proposed drainage is designed with self-cleaning velocity to minimise blockage. • Silt and other solids arising from emptying and cleaning operations may cause pollution, and should therefore be disposed of in a suitable manner in accordance with local regulations. • Maintenance should be avoided in bad weather / heavy rainfall. • Tasks that are classed as non-urgent repairs should wait for lane closure to be carried out.
2		Emptying and cleaning drainage systems such as gullies, combined kerb/drainage, linear drain systems, catch pits.	Regular (every 12 months or after each major storm)	Lane closure to allow access for purpose built vehicles.		• Access to the combined kerb/drainage, linear systems is via its rodding access and/or outlet units. • Using standard vacuuming and jetting equipment.	Some disruption to road users during lane closure.		• Working near live traffic / NMUs. • Combined kerb/drainage, linear systems access units are located along the system to provide effective maintenance points.	
3		Inspection on all carrier drains / grated "u" Channels (below ground)	Occasional (every 10 years)	Lane closure to allow access for purpose built vehicles.		• CCTV survey should be used where possible. No man-entry required. • Task can be done in conjunction with flushing.	Some disruption to road users during lane closure.		• Working near live traffic / NMUs.	
4		Surface water drainage pipe network cleaning (blockage, emergency)	Remedial / Reactive (when required)	Lane closure to allow access for purpose built vehicles.		• Conventional methods (e.g. high/low pressure jetting / suction). Depend on the extent of works required.	Some disruption to road users if lane closure is required.		• Working near live traffic / NMUs. • Emergency may involve flooding on roads, accidental spillages etc.	
5		Surface water drainage pipe rehabilitation	Remedial (when required)	Lane closure to allow access for purpose built vehicles.		• Methods depending on types of repair required. • Trenchless pipe lining techniques available so no major excavation required.	Some disruption to road users during lane closure. Trenchless techniques minimise disruption to road users.		• Working near live traffic / NMUs.	
6		Clearing and cleaning culverts. De-silting.	Occasional (determined by routine inspection)	Lane closure to allow access for purpose built vehicles. (If off-road site is unavailable)		• Conventional methods (e.g. high/low pressure jetting / suction). Depend on the extent of works required.	Some disruption to road users if lane closure is required.		• Working near shallow ditches that may contain water. • Task frequency can be reduced by fitting inlets/outlets with trash screens and routine debris removal.	
7		Emptying and cleaning vortex grit separators	Regular (every 12 months or after each major storm)	Lane closure to allow access for purpose built vehicles.		• Access to the vortex grit separator via chamber cover – non-man entry. • Using standard vacuuming and jetting equipment.	Some disruption to road users during lane closure.		• Working near live traffic.	

DRAINAGE MAINTENANCE SCHEDULE										
Ref	**Group Item**	**Tasks**	**Frequency**	**Traffic Management Measures**	**Assumed Means of Safe Access**	**Assumed Safe Method of Maintenance Work**	**Impact on Day-to-Day Operations**	**Impacts on Current Maintenance Activities**	**Scheme Specific Safety Measures and Risks**	**Remarks**
8	Wetlands	Inspection to identify any areas of the wetlands that is not operating correctly. Litter/debris removal that is detrimental to the operation of the wetland	Regular (monthly or after each major storm)	Wetlands with off network access do not require TM. Single lane closure to allow access to wetlands of offline by-pass	• Offline maintenance track provides easy and safe access for people and vehicles to the Wetland. • Maintenance access track is provided around the Wetland to provide close access to Wetland and all associated structures/features. • The existing Wetland is fenced for security. • The existing Wetland has side slopes of less than 1:3.	• All structures can be easily inspected without entering the structures. • All structures apart from the PCD chamber are of an open design. • See 'Safety Measures and Risks'.	None. Wetland locate away from carriageways.	None – current operating as a Wetland	• Need to work on gentle side slopes (1 in 3 or less) • Maintenance should be avoided in bad weather / heavy rainfall.	• Silt and other solids arising from emptying and cleaning operations may cause pollution, and should therefore be disposed of in a suitable manner in accordance with local regulations. • Maintenance should be avoided in bad weather / heavy rainfall.
9		Weed invasive, plant control for the Wetland.	Regular			• Conduct as part of the landscape maintenance for the scheme. • Operatives must wear appropriate clothing and PPE			• Maintenance should be avoided in bad weather / heavy rainfall.	
10		Sediment management for the Wetland	Occasional (determined by routine inspection)			• The operation involves using a vacuum tanker which requires no man-handling of possible contaminated silt. • Entry to structure should be avoided where possible. • Most sediment is designed to be trapped in the Wetland.				
11		Repair eroded areas	Remedial (when required)			• Immediate working area to be cleared.			• Block water from the working area and reinstate after remedial work.	
12	Flow Control Device	Inspect and remove any obstructions	Regular (monthly or after each major storm)	Single lane closure to allow access to chamber	• Access is via the road network. Operate under lane closure. • Avoid entry to chamber where possible. (Confined space entry)	• All operations are carried out above ground. (where possible) • Maintenance activity in confined space to use safe systems of working	Some disruption to road users during lane closure.	Increased	• Working near live traffic. Confined space entry	

APPENDIX F – COMMENTS FROM ENVIRONMENT AGENCY ON DRAFT FRA AND RESPONSES TO THEM

Page Left Intentionally Blank

MEMO

ARCADIS Design & Consultancy for natural and built assets

SUBJECT
A585 Windy Harbour to Skippool Flood Risk Assessment: Response to Environment Agency Comments August 2018

DATE
13 September 2018

DEPARTMENT
Water Management and Resilience

COPIES TO
Arcadis Project

TO
Environment Agency Contacts

OUR REF

PROJECT NUMBER
10013463

FROM
Water Environment and FRA Lead

A Flood Risk Assessment (FRA) was prepared for the Scheme and the report, together with the hydraulic models developed to inform the FRA, was submitted to the Environment Agency for comment in May 2018. Comments on the submitted information were provided by the EA on 22nd August 2018. This memo summarises the key points raised in the EA's response (highlighted in *blue italics*) and our responses to them. The comments will be addressed in the next iteration of the FRA report (post DCO submission and during the Pre Examination phase). Dialogue with the EA is continuing, with a meeting between parties on the 18th October 2018 at which good progress was made in addressing the comments below. Dialogue will continue with the aim of receiving approval in principle for the FRA.

There is no Non Technical Summary (NTS)

An NTS has been added to the revised FRA.

Section 2.4.1 - flood history: The wording suggests the EA failed in their obligations to provide information.

We will reword this section within the revised FRA.

Section 5 - Assessment methodology is too technical.

We will remove the technical modelling elements from the main body of the FRA report and create a new annex to the FRA. This annex will set out the modelling detail along with a register of EA model review comments and our responses to them.

Section 5.2 - Use of 2015 LiDAR may not account for development and key features occurring within the catchment after this time.

We have reviewed aerial mapping and the latest LiDAR download, neither of which identified any obvious significant development since 2015 that would be likely to impact on the overall conclusions of the FRA. MasterMap data (updated in 2016) was used to define roughness and hence any buildings present at this time would be expected to be included within this data set and therefore represented in our model.

We are aware of the Moorfields Park development (Figure 1) which is currently under construction

however, no development is proposed within our modelled flood outline. Furthermore, modelling carried out by Edenvale Young to inform the Moorfields Park FRA did not identify a risk to the development from the Main Dyke[1]. It is therefore concluded that our model accounts for all key topographical features up to the present day that have potential to affect its flood predictions.

Figure 1 Proposed Moorfields Park Development Layout (Source Ironside Farrar Limited)

5.4 Roughness and buildings – 'Stubby' buildings can and should be used for fluvial and coastal modelling studies.

This issue was raised in the model review comments supplied by the EA to Arcadis in July 2018. The comment stated: *'Increased roughness only for buildings has been implemented. Stubby buildings approach is recommended for an FRA but not considered essential. No explanation of choice of method given in the reporting supplied. Use of method should be justified'*. This comment suggests that the approach taken in the A585 model is acceptable but that an explanation for the approach used should be provided. This explanation will be added to the FRA modelling annex to be provided in the revised FRA.

Furthermore, sensitivity testing on the approach used to modelling buildings has been carried out for similar studies (at the request of the EA) and has shown minimal impacts on the overall conclusions drawn from the model results. In addition, use of increased roughness as a method for modelling buildings has been accepted by other EA regions.

5.4 Model Extent - provide satisfactory comments as to why the model extent was selected

Our previous response to the comments received from the EA in July 2018 was as follows:

[1] Ironside Farrar Limited (March 2015) Flood Risk Assessment Garstang Road East, Poulton Le Fylde.

The model extent was chosen for two reasons:

1. The proposed road turns away from the Main Dyke upstream of Garstang Road and crosses much higher ground which is outside the floodplain associated with the Main Dyke. Therefore, it was not considered that the road in this location would impact on fluvial flood risk.

2. The existing EA model stopped just upstream of the Garstang Road. Given the issues discussed in point 1 above, it was not considered of sufficient benefit to procure additional survey to extend the model of the Main Dyke further upstream.

Subsequent to providing this response, the proposed Scheme alignment has been overlain onto the EA flood map for planning (downloaded 07/09/18). This shows that the footprint of the Scheme marginally encroaches into Flood Zone 3 upstream of Garstang Road (Figure 2). Although not specifically included in our model, given that land on the right bank is lower than the developed land on the left bank (Figure 3), the impact of this would be negligible. It is considered that no conclusions of the current FRA would be affected.

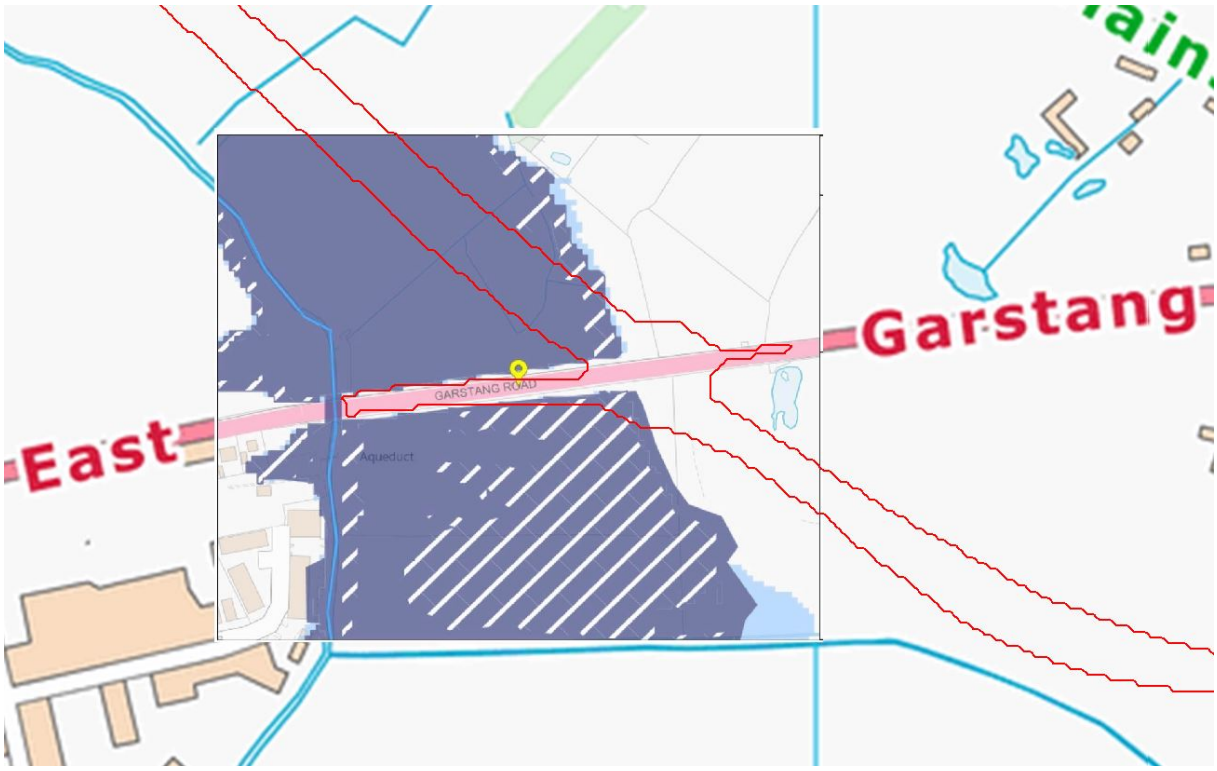


Figure 2 Flood Map for Planning and proposed route of the A585 (outlined in red)

Figure 3 Looking south along the Main Dyke from Garstang Road (source Google StreetView)

5.4 Tidal Boundary is two years out of date; the impact maybe little or none but confirmation is required.

We have obtained data for the mean sea level at Heysham (approximately 20 miles to the north of the A585) which suggests that between the years 2000 and 2014, the mean sea level increased by 19mm, although in some intervening years the annual increase was greater (Figure 4 and Table 1). A 19mm increase on a peak tide level of between 6mAOD and 7mAOD is considered to have a small impact on the overall FRA conclusions.

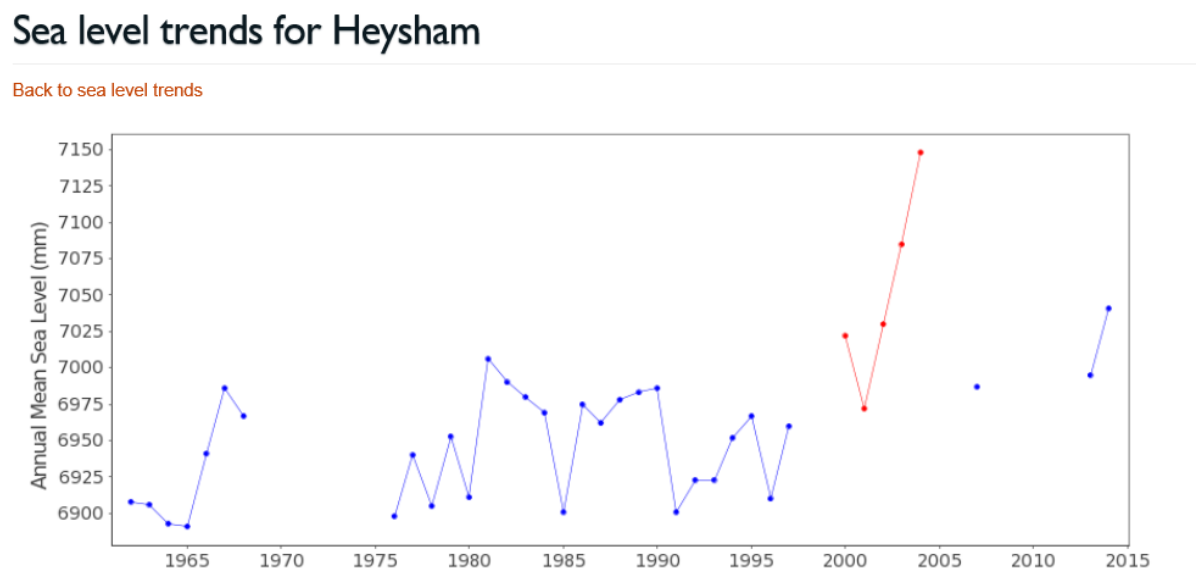


Figure 4 Sea Level Trends for Heysham (source https://www.ntslf.org/products/sea-level-trend-charts?name=Heysham&freq=annual)

Year	Annual Mean Sea Level (mm)	Change from Previous Recorded Data (mm)
2000	7022	
2001	6972	-50
2002	7030	58
2003	7085	55
2004	7148	63
2005	-99999	
2006	-99999	
2007	6987	-161
2008	-99999	
2009	-99999	
2010	-99999	
2011	-99999	
2012	-99999	
2013	6995	8
2014	7041	46

Table 1 Mean Sea Levels at Heysham 2000 - 2014 (source https://www.ntslf.org/products/sea-level-trend-charts?name=Heysham&freq=annual)

Furthermore, we have carried out sensitivity testing to assess the impact of tide locking on the Main Dyke outfall. This demonstrated that:

- Water levels are an average of 160mm lower for the 'with Scheme' run.
- Water levels remain unchanged for the Horsebridge Dyke from the tide locked 'with Scheme' run when compared against the tide locked baseline.
- The Scheme is not at risk of fluvial flooding during any of the modelled tide locked scenarios.
- The flood waters do not overtop the proposed Scheme embankment or the proposed Scheme crossing of the Main Dyke.

The sensitivity test results demonstrate that a small increase in the levels applied at the tidal boundary of the model would have a negligible impact on the overall conclusions of the FRA.

Mass Balance - convergence plots not explained in the FRA report

We will add these along with some commentary to the proposed FRA modelling annex.

Errors and Warnings 1D and 2D 1D - include all relevant info for completeness 2D - explain in the FRA reporting

We will add these along with some commentary to the proposed FRA modelling annex.

Table 10 - conclusions drawn are not clear

We will update this section within the revised FRA.

Construction phase flood mitigation proposals could form part of the DCO

These commitments are set out in the Outline Construction Environment Management Plan that has been prepared (document reference TR010035/APP/7.2) and the Record of Environmental Actions and Commitments (REAC) (document reference TR010035/APP/7.3), which form part of the DCO application.

6.7 Pool Foot Creek - clarify the paragraph 'resultant small flows, it is not anticipated that the Scheme will be at risk of fluvial flooding from this watercourse, which crosses the watercourse some 1.8m above the level of the surrounding floodplain'

We will review the vertical alignment of the Scheme in this location and update the revised FRA report with suitable elevation data which will clarify the risk for flooding from this source.

6.7 Limitations of the model - text is too generic/cover all

We will review this section and add further detail where necessary within the revised FRA and its technical modelling annex.

8.1 Protection of 3rd parties - tidal flood risk is not well enough described and it is not clear where and how tidal risk is increased

We will update this section within the revised FRA to provide further clarity.

8.2 Protection of the Scheme - tidal risks are concerning; Clarify what parts of the scheme are at risk of flooding and what can and cannot be resolved through mitigation as part of the design. Explain why betterment can't be provided.

In the revised FRA we will provide further clarity on the tidal flood risks to the Scheme. We will set out the design constraints to mitigating this source of flood risk and will discuss these matters further with the EA to reach an agreed position.

8.3.1 temporary defences; more info is required if temp defences are a serious consideration

Following further consideration, provision of temporary defences is not considered a likely option, therefore reference to these will be removed in the revised FRA.

9 - Compensation storage Develop further the proposals for compensation storage

We are currently working with the A585 Design Team to refine these proposals and will carry out some additional model runs. The results of this modelling will be included in the revised FRA.

Appendix D - maps are truncated and do not show the eastern section of the scheme nr Windy Harbour junction

This section of the Scheme is at risk of tidal flooding only; we have not modelled this area but the JBA Wyre Estuary model shows that there is no risk to the Scheme at this location (Table 10 of the FRA). We will make this clearer in the revised FRA.

In the email dated 2 July 2018 we are advised that colleagues in your bridge design team have requested it be highlighted to us that the minimum proposed soffit level of the A585 crossing over the Main Dyke is 5.020 metres above Ordnance Datum (mAOD).

You advised us that this is above all the design events you have tested. This includes 1% Annual Exceedance Probability (AEP) plus 30% climate change and 35% climate change and the 0.1% AEP scenario). You have not tested the 1% AEP plus 70% for climate change which has a peak stage of 5.201mAOD. You asked us if we were able to confirm that this is acceptable.

Note that we have tested the 1% AEP plus 70% event and hence we can confirm that the peak water level for this event is above the proposed soffit level of the new Skippool Bridge.

We would advise that we are not in a position to agree in such basic terms. This is because: 1. the flood modelling work that would support the FRA is currently in development and is still under review (as clarified above); and as you will be aware 2. any proposed new 'essential infrastructure' bridges need to conform to general principals.

If, under the design currently being considered, the structure cannot accommodate the required design flows then clear justification would need to be provided. The design will need to conform to the National Planning Policy Framework requirements, the Environment Agency's internal guidance on how to apply the climate change allowances for flood risk and GOV.UK advice on climate change allowances for flood risk assessments, as it relates to land use planning and Environmental Permitting for flood risk activity permit requirements, namely the 1 in 100 year flow, plus upper climate change allowance, plus allowance for freeboard, without surcharge.

Model results show that the new bridge provides considerable betterment over the existing situation.

Any potential impacts would need to modelled in detail and mitigation measures to manage any over land flow for the upper end estimate would need to be accommodated for as part of the overall design. The FRA must demonstrate that there will be no increase in flooding as a result of the changes, and ideally an overall benefit. In Flood Zone 3a 'essential infrastructure' should be designed and constructed to remain operational and safe in times of flood.

We have modelled the potential impacts in detail and report in the FRA that the 'with Scheme' model does result in a betterment against the existing situation for the 1% AEP plus 70% fluvial event.