clarkebond

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

INGLEWOOD, PAIGNTON

WB03590 - FR01

ABACUS PROJECTS AND DEELEY FREED ESTATES

Report No.	Date.
WB03590 – FR01	11/10/17

Project
Inglewood, Paignton Flood Risk Assessment

Client Name
Abacus Projects / Deeley Freed Estates

Issue Date/ Number	Status	Description of Amendments
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Executive Summary

Project Name	Inglewood, Paignton
Site	Greenfield land of 31ha located off Brixham Road in Paignton. National Grid Reference: SX 88161 57496, nearest post code: TQ4 7SN
Development Description and Vulnerability to Flooding	Proposal for up to 400 residential dwellings, a 2 form entry primary school and public house with associated landscaping and access infrastructure. The residential development, school and public house are classified as 'More Vulnerable' to flooding in accordance with paragraph 066 of NPPG.
Hydrology & Flood Risk	The site is located 1km south-west of Tor Bay and 1.2km north-east of the River Dart estuary. The nearest watercourse is the Galmpton Watercourse, a tributary of the Dart which is classified as Main River. The Flood Map for Planning shows the entire site is in Flood Zone 1 and is a considerable distance from the floodplain, which means there is a low risk (less than 0.1% chance) of flooding from Main Rivers and the sea, both in present day and when accounting for climate change. Sites in Flood Zone 1 are suitable for all types of development (including 'More Vulnerable') and pass the Sequential Test. The flood risk to the site from all other sources was considered to be low for the following reasons: • Ordinary Watercourse – No ordinary watercourses close to the site; • Sewer – No record of historic flooding at the site in SFRA and no pumping stations upslope of site; • Groundwater – SFRA states that only coastal areas are at risk and the site is at a higher elevation than surrounding areas; • Surface water – Geology is indicative of permeable ground and site is well sloped so ponding of surface water is unlikely. There is also no scope for runoff to enter site from elsewhere due to the elevation of site; • Artificial infrastructure failure – No artificial infrastructure near the site.
Flood Risk Management Measures	Due to the low flood risk at the site, no measures are required to protect the development from flooding. However, measures are required during the construction and completed development phase to ensure surface water and foul water flood risk downstream is not increased. This is particularly important as the village of Galmpton downslope of the site was identified in the SFRA as an 'Area Sensitive to Flooding'. Surface water risk during construction will be mitigated by adhering to suitable method statements to be agreed with the Local Authority and Environment Agency. Surface water risk for the completed development will be mitigated by the proposed drainage strategy. South West Water have completed a capacity assessment of the public foul sewer and confirmed that upgrade works will be required to accommodate the new development, which will be part funded by the developer.

Drainage Strategy	The drainage strategy has been developed in accordance with the surface water drainage hierarchy and includes various SuDS measures to sustainably manage runoff on site. The majority of the site had favourable infiltration rates and so the runoff will largely be managed by the preferred method of on-plot infiltration up to the 1 in 100 year plus climate change event. In the east of the site, infiltration rates were less favourable and so this area will connect to the public sewer in the field to the south of the site. Runoff into the sewer will be restricted to Greenfield rates with attenuation storage provided on site. This strategy presents a significant improvement on the existing runoff regime, with minimal offsite discharge even in extreme rainfall events. This will benefit downstream areas including development off the southern extent of Brixham Road and development west of Galmpton. It is proposed that foul flows from the development will discharge into the 300mm public foul sewer in the field to the south of the site. Due to topography, part of the site requires pumping to reach the point of connection.

1 Introduction

1.1 Overview

This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared by Clarkebond (UK) Ltd, on behalf of Abacus Projects and Deeley Freed Estates, in support of a planning application for a residential led, mixed-use development on Greenfield land in Paignton.

The report has been undertaken in accordance with flood risk policy contained within the National Planning Policy Framework (NPPF). The assessment of flood risk was informed by the Level 1[1] Strategic Flood Risk Assessment (SFRA) for the Torbay area, and maps available on the government website. Various site surveys were also undertaken in the development of the drainage strategy including: walkover survey to assess drainage; topographical survey; infiltration testing; and modelling of the receiving public foul sewer network.

The main purpose of the report is to provide sufficient flood risk information to ensure the development is safe from flooding and would not pose a risk to third parties, with a focus on the management of surface water runoff.

1.2 Site Location and Description

The overall site covers approximately 31 hectares and is currently used for agriculture. The development extends to the south-west of Brixham Road (the A3022) and can be located by National Grid Reference SX 88161 57496 or the nearest postcode of TQ4 7SN. **Map 1** (**Appendix A**) shows the site location and redline boundary.

1.3 Proposed Development

The proposal, known as Inglewood, is for up to 400 residential dwellings, a 2 form entry primary school and a public house, complete with new access infrastructure and landscaping. A copy of the proposed masterplan is included as **Appendix B**.

1.4 Objectives

The main objectives of this FRA and drainage strategy are:

- Identify the probability or otherwise of flooding at the proposed development site.
- Demonstrate the site passes the Sequential Test.
- Demonstrate that the development will not increase flood risk elsewhere, and where possible, will reduce flood risk.
- Outline measures to mitigate and manage flood risk where required.
- Outline the drainage strategy for the site and discuss potential to adopt Sustainable Drainage Systems (SuDS).

[1] Torbay Council (2008) Level 1 Strategic Flood Risk Assessment

1.5 Limitations

The information, views and conclusions drawn concerning the site are based, in part, on information supplied to Clarkebond by other parties. Clarkebond has proceeded in good faith on the assumption that this information is accurate. Clarkebond accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to Clarkebond from others.

2 Flood Risk Policy

2.1 Overview of National Planning Policy Framework (NPPF)

National policy on flood risk is set out in paragraphs 100 to 104 of the NPPF which is also supplemented by National Planning Practice Guidance (NPPG) for flood risk and coastal change. The overarching aim of the NPPF is to ensure inappropriate development in areas at risk of flooding are avoided, which is achieved via application of the Sequential Test. In summary this test aims to highlight the areas at lowest probability of flooding (Flood Zone 1) and steer new development to these areas. If the location of the low risk area is not suitable due to wider sustainability objectives then progressively higher risk areas (Flood Zone 2/Flood Zone 3) can be considered provided the development will be suitably safe from flooding and does not increase flood risk to other areas.

The process for undertaking the Sequential Test is shown in **Figure 1**. Flood Zones 1-3 relate to the risk of flooding from Main Rivers (rivers managed by the EA) and the sea, and are used as the primary indicator of whether land is suitable for development. **Table 1** (taken from Table 1 of NPPG) details the corresponding meaning of flood zones in relation to flood risk.

Figure 1: Process of the Sequential Test

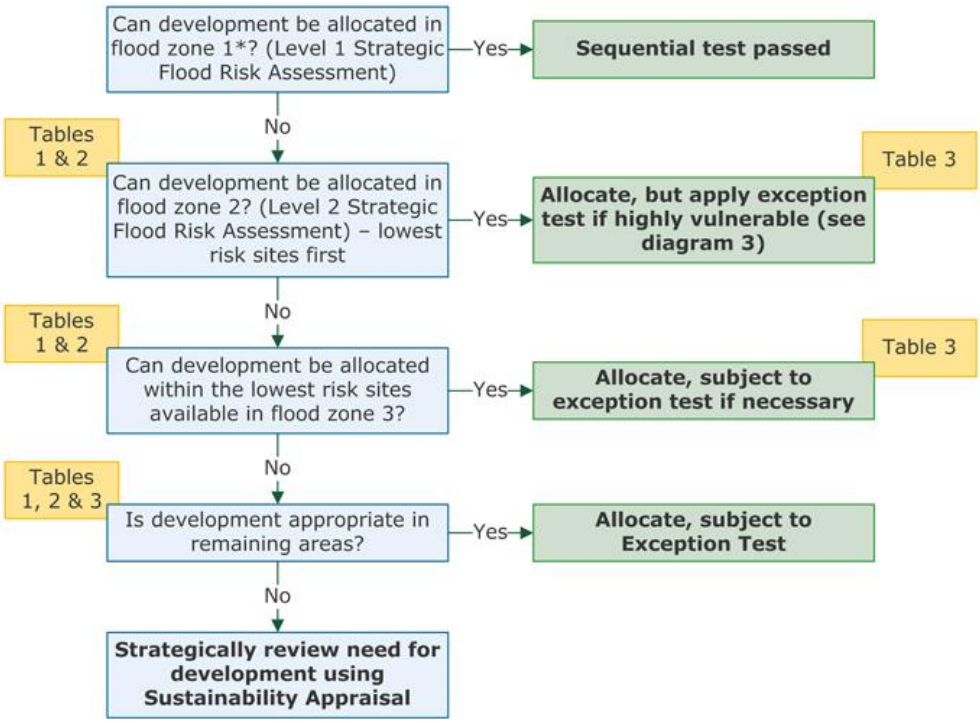


Table 1: Definition of Flood Zones defined in the NPPG

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. The Strategic Flood Risk Assessments should identify the areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

If a higher flood risk area is considered, NPPG states that the suitability of the development and any mitigation measures should be assessed against the following extreme flood events, also known as the 'design flood':

- 1 in 100 year (1%) fluvial flood accounting for climate change
- 1 in 200 year (0.5%) tidal/coastal flood accounting for climate change

Development should only be permitted where:

- Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location
- Development is appropriately flood resilient and resistant, including safe access and escape routes where required and ensuring that any residual risk of flooding is safely managed.

Climate change is projected to increase the likelihood of flooding from most flood sources and therefore an assessment of the effects of climate change should be considered over the estimated development lifetime. The lifetime for non-residential development depends on the characteristics of the development, but this is generally accepted as 75 years, in accordance with British Standards.

2.2 Requirements of FRA

Footnote 20 of the NPPF states that a site-specific FRA is required for developments which:

- Are in Flood Zone 2 or 3
- Are more than 1 hectare (ha) in Flood Zone 1
- Are in an area which has critical drainage problems as notified by the Environment Agency

- could be affected by sources of flooding other than rivers and the sea (e.g. surface water drains, reservoirs)

The focus of FRAs for the higher risk zones is to fully assess the extent, depth and hazard of flood waters, detail the required mitigation to manage flood risk (e.g. floor levels and access, evacuation routes, compensatory storage) and outline a surface water management plan. FRAs for sites where the risk of flooding from rivers or the sea is classified as low (Flood Zone 1) will still need to assess all other sources of flood risk, but will have a strong focus on management of surface water runoff.

2.3 Local Planning Policy

The site is within the administrative boundary of Torbay Council, where development planning from 2012-2030 is informed by the Council's most recent Local Plan (adopted December 2015). Policy ER1 is used to ensure that development is located in appropriate areas of flood risk; this largely reflects the requirements of the NPPF regarding application of the Sequential Test (Refer to **Appendix C**).

However, the Plan states that all of Torbay has been designated a 'Critical Drainage Area' which means the EA have identified the whole area as having drainage problems which lead to localised flooding. As such, all new development requires an FRA, including those in Flood Zone 1 and less than 1ha. There is also a strong emphasis in the Plan on the use of Sustainable urban Drainage Systems (SuDS) and water storage areas in the design of new developments to ensure the existing problem is not exacerbated. This includes a requirement for offsite runoff to be limited to pre-development rates up to a maximum 1 in 10 year discharge.

2.4 Vulnerability Classifications of Development

Table 2 (Paragraph 066 Reference ID: 7-066-20140306) of NPPG defines different categories of development based on their vulnerability to flooding. According to this table, both the residential development and school are classified as 'More Vulnerable' development.

3 Hydrology and Drainage

3.1 Hydrology

The site is approximately 1km west of Tor Bay coastline and is within the catchment area of the River Dart estuary which is located approximately 1.2km to the south-west. The River Dart rises as two tributaries (East and West Dart) in Dartmoor National Park. The river becomes tidal downstream of a seventeenth century weir in Totnes and opens out into an estuary before passing the site.

The closest watercourse to the site is the Galmpton Watercourse, a tributary of the River Dart located 730m south of the site boundary. The catchment of this watercourse is small and steep, and there are a number of culverted sections which poses a flood risk to the town of Galmpton.

There are a few small seasonal ponds within the site boundary, but there are no major water features within or upstream of the site. **Map 2 (Appendix A)** shows the local hydrological setting, with blue arrows indicating the direction of flow.

3.2 Existing Drainage Pathways

The topographic survey (**Appendix D**) shows the overall slope of the site is from north to south, which will be the prevailing direction of runoff. The northern boundary is located on a ridgeline running in an east-west direction with an approximate level of 81m AOD. The northern two fields slope southwards from this ridgeline with an average gradient of 1:12. South of these fields, the site is divided by another ridgeline at approximately 69m AOD running in a north-south direction, which means the three fields in the west drain westwards towards the River Dart, the field to the east drains eastwards towards Tor Bay and the southern-most field drains southwards towards the Galmpton Watercourse. Only one field ditch was identified which sub-divides two of the western fields.

3.3 Public Sewers

South West Water is the sewerage undertaker in Paignton who are responsible for the public sewer network. Maps of the public sewers surrounding the site are included as **Appendix E** (dashed blue line for surface water and dashed pink line for foul).

The first thing to note is the proposed development is located outside the easement of the public sewers. The nearest foul and surface water sewers to the site are on the opposite side of Brixham Road to the rear of properties on Steed Close. Both networks drain southwards and cross Brixham Road into the fields approximately 100m to the south-east of the site. The foul sewer is 300mm diameter at this location, and continues southwards before joining Brixham Road adjacent to Dell Cottage. It then turns to drain northwards along the A379. The surface water sewer is a large sewer of 675mm diameter which drains in a south-westerly direction through the fields to the south of the site.

4 Flood Risk Assessment

4.1 Flood Zones (Rivers and Sea)

The flood zone map for planning included (**Map 3, Appendix A**) shows the entire site is located in Flood Zone 1; the area of lowest flood risk with less than a 1 in 1000 (0.1%) chance of flooding from Main Rivers and the sea annually. The map does not show the floodplain of the design event when accounting for climate change, but as the site is a considerable distance from the coastal and fluvial floodplain, it is considered to be at low risk over the development lifetime.

As the site is within Flood Zone 1 it passes the Sequential Test in accordance with **Figure 1**. It is also compatible with all forms of development proposed on site in accordance with **Table 2** (taken from Table 3 of NPPG).

Table 2: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zones	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	X	Exception Test required	✓
	Zone 3b	Exception Test required	✓	X	X	X

*Where ✓ means the development is appropriate and **X** means the development should not be permitted*

4.2 Other Sources of Flood Risk

Other sources of flooding which need to be assessed are:

- Ordinary watercourses (watercourses not under jurisdiction of EA)
- Groundwater
- Surface water
- Sewers (sewer and drain exceedance and pumping station failure)
- Reservoirs, canals and other artificial waterbodies

4.2.1 Ordinary Watercourse Flooding

It is clear that there are no ordinary watercourses near to the site and so the flood risk posed by this source is nil.

4.2.2 Groundwater Flooding

The Level 1 SFRA was reviewed to assess the risk posed by all other sources. The report indicates that groundwater flooding is not a major problem within Torbay and would only pose a risk in low-lying coastal areas. OS mapping indicates that the site is at a relatively high elevation in relation to surrounding areas (**Map 4, Appendix A**), and so the risk of groundwater flooding is low.

4.2.3 Sewer Flooding

The sewer flood map in the Level 1 SFRA does not identify a risk of public sewer flooding during a 1 in 50 year event in the Paignton sewer network adjacent to the site (See **Appendix F**). There are also no major pumping stations near the site which could pose a flood risk due to failure. Furthermore, the highway flooding map does not identify any historic incidents of flooded drains adjacent to the site (See **Appendix F**). Therefore, the sewer flood risk to the site is considered to be low under normal operating conditions.

4.2.4 Surface Water Flooding

The risk from surface water can be inferred from the geology and topography of the site and surrounding area. Sites most at risk of flooding are underlain by low permeability ground with a shallow gradient and depressions in the ground surface which promote ponding / channelling of surface water. Sites at lower elevations can also be at risk from steep, impermeable land upslope.

An intrusive ground investigation, using trial pits, was undertaken by Clarkebond in April 2017 which confirmed that the site geology is divided into Saltern Cove Formation (Mudstone and Limestone) in the north of the site and Brixham Limestone Formation (Limestone) to the south. The geology maps also show the area to be heavily faulted. This geology is indicative of relatively permeable ground which is less susceptible to surface water flooding, which was also confirmed in the soakaway testing undertaken (refer to Section 6). The site is also at higher elevation than surrounding areas and is sloped to promote drainage and prevent ponding/waterlogging.

The OS topographic map and the government surface water flood risk map (Maps 4 and 5, Appendix A) clearly show that there are no prominent channels running through the site where surface water would preferentially flow. There is a valley running along the site western boundary and a valley which begins in the eastern corner adjacent to Brixham Road but both are avoided in the development layout. Therefore, the risk of surface water flooding is considered to be low.

4.2.5 Flooding from Artificial Infrastructure Failure

There are no reservoirs or other artificial waterbodies upstream of the site and so the risk posed by this source is nil.

4.3 Groundwater Source Protection Zone

The nearest groundwater abstraction licence is 311m to the north and the site is not located in a Groundwater Source Protection Zone. Therefore, runoff from the proposed development will not pose a risk to important water sources.

4.4 Flood Risk Elsewhere

The SFRA states that several hundred properties, businesses and highways are at risk from flooding, where events typically have a rapid onset without much warning. These circumstances pose a credible risk to people and would result in significant damage, disruption and distress.

Two significant flood events are of particular note; one which took place in 1999 leading to flooding of Paignton town centre to the north of the site, and Galmpton to the south (amongst other areas), and another which took place in 2004 leading to coastal flooding of the seafront areas of Paignton, Torquay and Goodrington. Flooding of Galmpton was highlighted as being particularly severe, leading to the watercourse being adopted as a Main River and the construction of flood alleviation works.

The development has the potential to increase foul and surface water flood risk in the downstream catchment if not constructed and designed with suitable mitigation. Potentially vulnerable areas downstream include development off the southern extent of Brixham Road and development west of Galmpton near Kiln Road. Mitigation measures to address this risk will be managed in the proposed drainage strategy and are discussed in detail in Sections 5 and 6.

5 Mitigation Measures

5.1 Flood protection for development

The FRA has demonstrated that the risk of flooding from all sources is low and so no mitigation measures are required to protect development from flooding. Safe access and egress is also possible via Brixham Road in a fluvial flood event with up to a 1 in 1000 year return period.

5.2 Mitigating Impact of Development

Measures will need to be implemented during the construction phase and for the completed development to mitigate the risks of increased surface water runoff and watercourse blockage. This is particularly important at this site due to the designation of Torbay as a Critical Drainage Area, and the designation of the village of Galmpton as an 'Area Sensitive to Flooding' in the SFRA.

During the construction phase, temporary measures must be provided to ensure runoff and construction debris is safely managed on site. These measures are to be drawn up by the Contractor in method statements which will be agreed with the Council and the EA. This will minimise the risk of excess runoff, debris and contaminants from the proposal entering natural drainage network and causing pollution and risk of blockage. The surface water flood risk from the completed development will be mitigated by the drainage strategy discussed in the following section.

The development will also lead to an increase in foul flows into the drainage network, which will be managed to ensure there is no increase in foul water flood risk. A detailed capacity assessment was undertaken by Pell Frischmann on behalf of South West Water and they have identified that network improvements are required to accommodate the development. A contribution will be made by the developer in order for these upgrades to take place.

The proposed surface water drainage strategy presents a significant improvement on the existing surface water runoff regime, with minimal offsite discharge even in extreme rainfall events. This will benefit downstream areas including development off the southern extent of Brixham Road and development west of Galmpton.

6 Drainage Strategy

6.1 Surface Water Management Hierarchy

An appraisal was undertaken of the most suitable and sustainable method for managing surface water runoff from the development in accordance with the following hierarchy as discussed in Part H of Building Regulations and Paragraph 080 (Reference ID: 7-080-20150323) of NPPG:

- Infiltration to the ground using a sustainable drainage system.
- If this is not feasible, discharge to a watercourse or river; generally at a controlled rate unless it does not affect flood risk e.g. if to the sea or an estuary.
- Discharge at a controlled rate to a surface water sewer or drain.
- Only if the above have all been investigated and it has been proved that none of these options are suitable will discharge at a controlled rate to a combined sewer system be considered and the approval for this can only be given by the Water Authority.

To assess the possibility of the preferred method of infiltration, soakaway tests were undertaken during the geo-environmental investigation in accordance with BRE Digest 365 standards. The trial pit map is included in **Appendix G** and the infiltration rates are summarised in **Table 3**. Soakaway infiltration was undertaken in all trial pits apart from TP7, where time constraints did not allow a full test in TP7. However, this area was assumed to be impermeable because a small amount of water was added and showed no infiltration in 30 minutes.

Table 3: Soakaway Results

Trial Pit	Test Depth range (mbegl)	Corresponding Stratum	Soil Infiltration Rate (m/s)
TP1	0.38-1.1	Saltern Cove - Mudstone	3.38×10^{-5}
TP2	1.23-2.0	Saltern Cove - Mudstone	4.83×10^{-5}
TP3	1.17-2.2	Saltern Cove - Mudstone	3.26×10^{-4}*
TP4	1.03-2.0	Saltern Cove - Mudstone	1.09×10^{-5}
TP5	0.96-1.9	Saltern Cove - Mudstone	7.22×10^{-6}
TP6	1.58-2.7	Saltern Cove - Mudstone	6.44×10^{-6}
TP8	1.54-2.5	Saltern Cove - Mudstone	3.94×10^{-5}
TP9	0.38-1.1	Brixham Limestone	3.43×10^{-5}*
TP101	0.87-2.2	Brixham Limestone	7.94×10^{-5}*
TP102	1.3-2.4	Saltern Cove - Mudstone	3.04×10^{-5}
TP103	0.8-1.1	Brixham Limestone	3.63×10^{-4}
TP104	0.85-1.9	Brixham Limestone	3.46×10^{-5}

** The soakaways in TP3, TP9 and TP101 did not yield typical results due to the opening of fissures (or potential of) in the base of the pits. TP3 opened up during the course of the first fill. TP9 underwent two full standard soaks, however during the third fill a fissure opened in the base of the pit, causing a sudden emptying of the water.*

There was poor infiltration in Trial Pits 5, 6 and 7 located in the eastern field which precludes the use of infiltration methods in this area. As there are also no watercourses near to the site, the proposal for this area is to discharge into the public sewer.

The remainder of the site demonstrated relatively favourable rates of between 1.09×10^{-5} and 3.63×10^{-4} which suggests that conventional soakaway drainage is feasible locally into the underlying Saltern Cove Formation.

The results show that caution should be used when considering soakaway drainage solutions, particularly within the Brixham Limestone Formation, due to a risk of solution features. These features are not always immediately visible or active during excavation, but appear to open due to the washout of fine materials during the course of the soakaways. Further testing should be completed, preferably at proposed locations based on the building layout.

6.2 Sustainable urban Drainage Systems (SuDS)

SuDS seek to manage surface water as close to its source as possible, mimicking surface water flows arising from the site prior to the proposed development. Wherever possible, a SuDS technique should seek to contribute to each of the three goals identified below with the favoured system contributing significantly to each objective.

1. Reduce flood risk (to the site and neighbouring areas),
2. Reduce pollution, and,
3. Provide landscape and wildlife benefits.

There are various SuDS measures which can be adopted which can be designed to infiltrate runoff to reduce the overall volume of water leaving a site (Option 1 in drainage hierarchy) and/or attenuate (slow) runoff in order to reduce peak flows in a receiving watercourse/sewer (Options 2, 3 and 4 in drainage hierarchy).

Table 4 includes examples of commonly used components in a SuDS system. The proposed drainage strategy makes use of a number of these components, giving priority to measures which provide additional benefits to water quality/ecology/amenity whilst taking into account the various site constraints and design objectives.

Various treatment stages have been adopted (a combination of source control and site control), an approach described as the SuDS 'Management Train' in CIRIA's 2015 SUDS Manual. This means that as much runoff as possible is managed where it falls (source), but measures are also included to contain runoff on-site where source control is not feasible (site).

Table 4: Examples of Sustainable urban Drainage Systems

SuDS Measure	Description	Source/Site Control?
Infiltration/attenuation basins, ponds and wetlands	Depressions in the ground that are utilised for surface runoff storage and also provide high potential for ecological, aesthetic and amenity benefits.	Site control
Swales	Vegetated channels used to convey rainwater, which remove pollutants and may permit infiltration in permeable soils.	Site control
Infiltration trenches	Gravel-filled channel which conveys flows, sometimes with a perforated pipe at the base to outfall to a receiving waterbody.	Site countrol
Soakaway	Gravel-filled pit which water is piped into so it drain slowly out into the surrounding permeable soil	Source control
Soft Landscaping	Planted vegetation and green space used to increase the permeable area of the site and promote infiltration and interception of rainfall.	Source control
Filter strips	Vegetated areas of gently sloping ground alongside impermeable areas which remove pollutants and promote infiltration/evaporation.	Site control
Permeable paving	Paving that allows infiltration of rainwater either to the underlying soil (permeable sites) or permeable sub-base (impermeable sites).	Source or site control depending on design
Green roofs	Vegetated roofs that reduce the volume and rate of runoff entering downpipes and remove pollution.	Source control
Rainwater Harvesting/Butts	Collects water from roof runoff for re-use in household appliances or gardens.	Source control
Attenuation tanks	Below-ground tanks used to store attenuated flows, to be gradually released into the sewer network.	Site control

6.3 Proposed Surface Water Strategy

The drainage strategy drawings are included in **Appendix H** (drawings 600-604).

For the majority of the site, roof runoff from the residential buildings and the school will be managed by on-plot soakaways and runoff from the road network will be collected by a new highway drain which will discharge to a communal infiltration crate or basin located in the western field. Permeable paving is also proposed in areas where infiltration rates are favourable.

The proposal for two areas to the south and west of the site (where on-plot drainage is not feasible due to slow infiltration) is to drain via surface water sewers to a communal infiltration crate or basin. This will be located in the western field near the highway infiltration storage.

In the east of the site, infiltration was also shown to be poor. The proposal for this area is for runoff to be collected by new surface water sewers in the road network, which will connect to the 675mm diameter public sewer where it crosses Brixham Road. Runoff will be restricted to existing Greenfield rates, which were calculated using the ICP SUDS method in Windes Microdrainage. **Table 5** shows the overall Greenfield rates for the 31ha site and the equivalent rates per hectare for various storm events.

Table 5: Greenfield Runoff Rates

Storm Return Period	Runoff rate for overall site (l/s)	Runoff rate per ha (l/s)
QBAR	101	3.3
Q1 year	78.8	2.5
Q2 years	89.2	2.9
Q30 years	192.5	6.2
Q100 years	244.4	7.9

Storage for the restricted flows will be provided for up to the 1 in 100 year plus 40% climate change rainfall event. An attenuation pond will provide the majority of storage, but a small attenuation crate will also be required since part of the site in this area is too low to drain through the attenuation pond. The pond will have a plan area of 1330 m^2, side slopes of 1:4 and will be permanently wet with a water depth between 0.6m and 1.2m. The crate will have a plan area of 149m^2 and has been positioned to respect a minimum 3m clearance from the medium pressure gas main based on the positional information obtained from the services record drawings. The exact location will need to be confirmed by proper GPS services location or trial pits.

6.4 Proposed Foul Water Strategy

Foul flows from the east of the site will drain via gravity sewers to the south-east, with a proposed connection to the 300mm diameter public sewer where it crosses Brixham Road (see **Appendix H**). The remainder of the site will drain via gravity to a pumping station in the far west of the site, with a rising main from here to the gravity network in the east.

The pumping station has a 15m cordon sanitaire where no development is permitted in accordance with Sewers for Adoption requirements.

6.5 Ownership and Maintenance

The foul network has been designed to be adopted by South West Water. The surface water network and SuDS features will be owned and maintained by a private management company which will be secured by the developer through the Section 106 agreement.

7 Conclusion

The report has demonstrated that the site is in Flood Zone 1 and is at low risk of flooding from all sources over the proposed development lifetime. Therefore the site passes the Sequential Test and is suitable for the proposed development in accordance with NPPG.

No mitigation measures are required to protect the development from flooding, but measures are required to ensure the development does not increase surface water and foul flood risk downstream. This includes measures to be implemented in the construction phase by the Contractors and measures to be included in the drainage design.

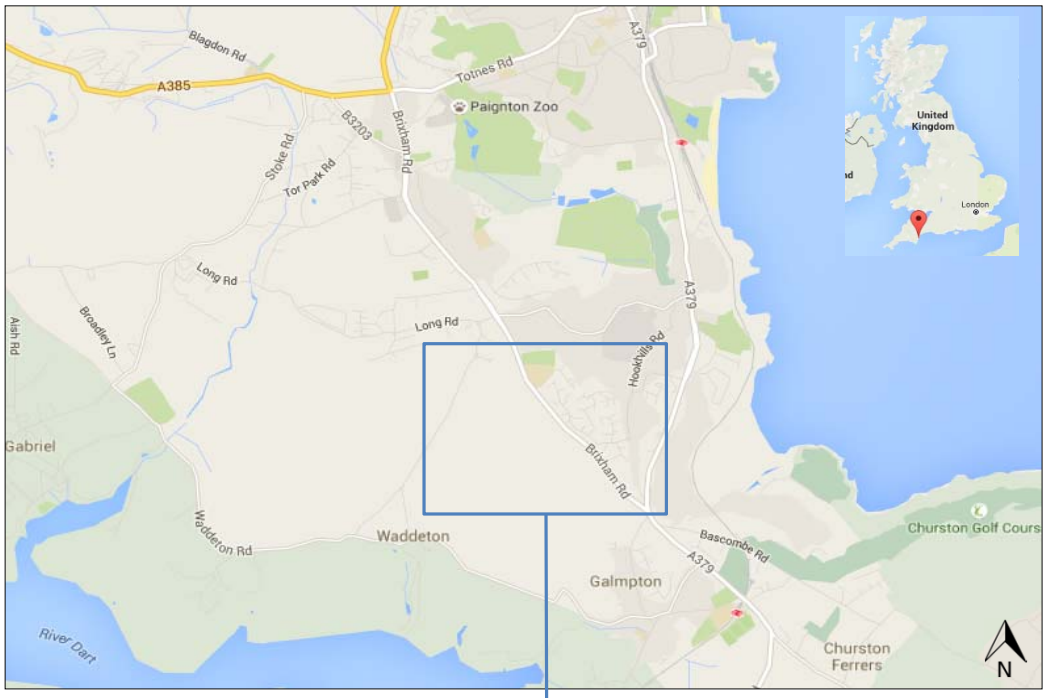
The surface water drainage strategy has been developed in accordance with best-practice guidance and sustainable drainage principles and presents a significant improvement in flood risk to downstream areas from the existing situation.

The foul strategy is to connect to the existing public sewer to the south of the site. Network modelling is currently being undertaken by South West Water to confirm capacity of the network and any upgrade works required to ensure the development will not pose a risk of foul water flooding.

8 Appendices

Appendix A - Maps

(5 pages)



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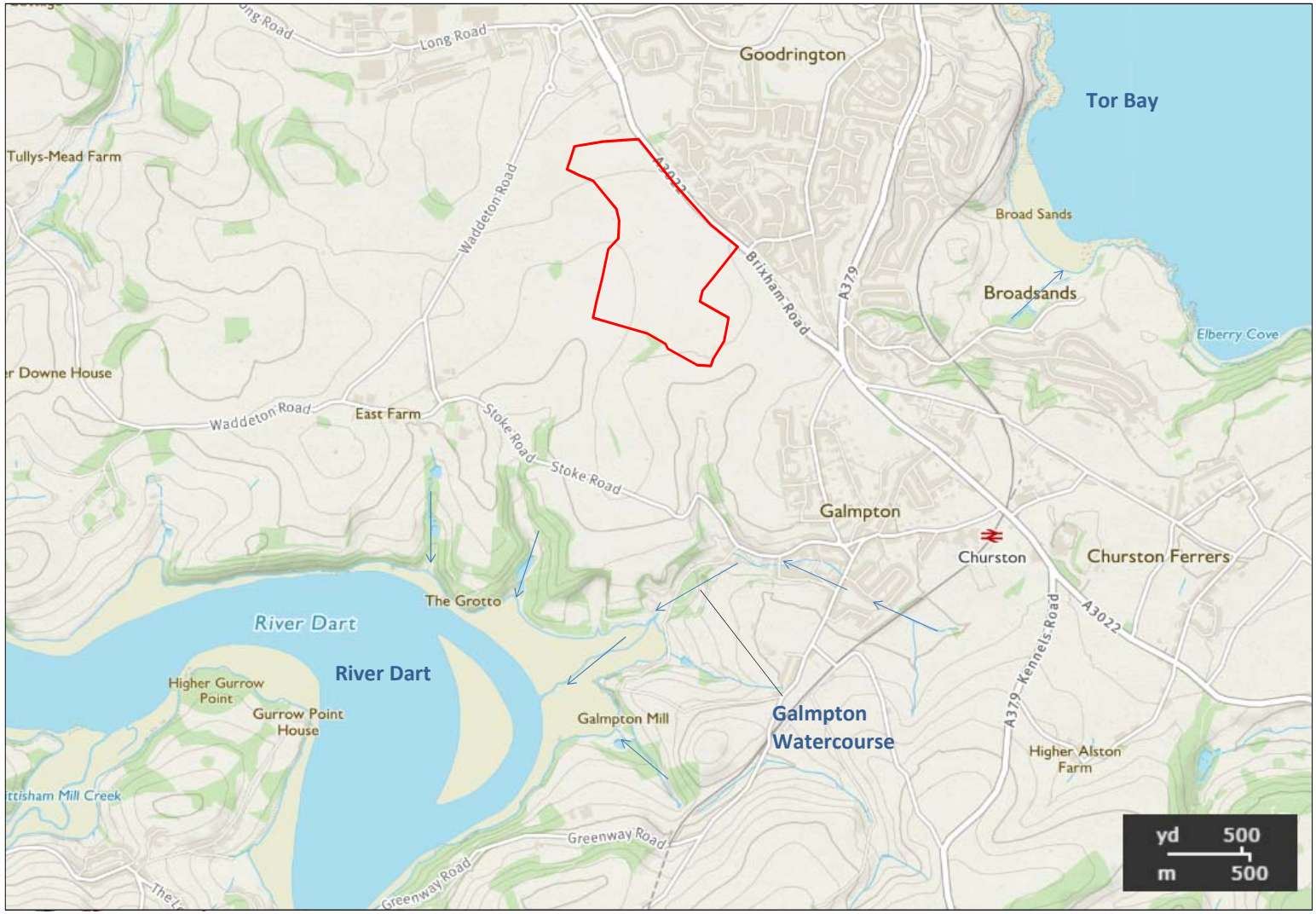
Bristol Exeter London

Project:	Drawn:	Scale:
Inglewood, Paignton Flood Risk Assessment and Drainage Strategy	GG	NTS
	Checked: SD	Date: May-17
Title: Site Location Plan	Map 1	



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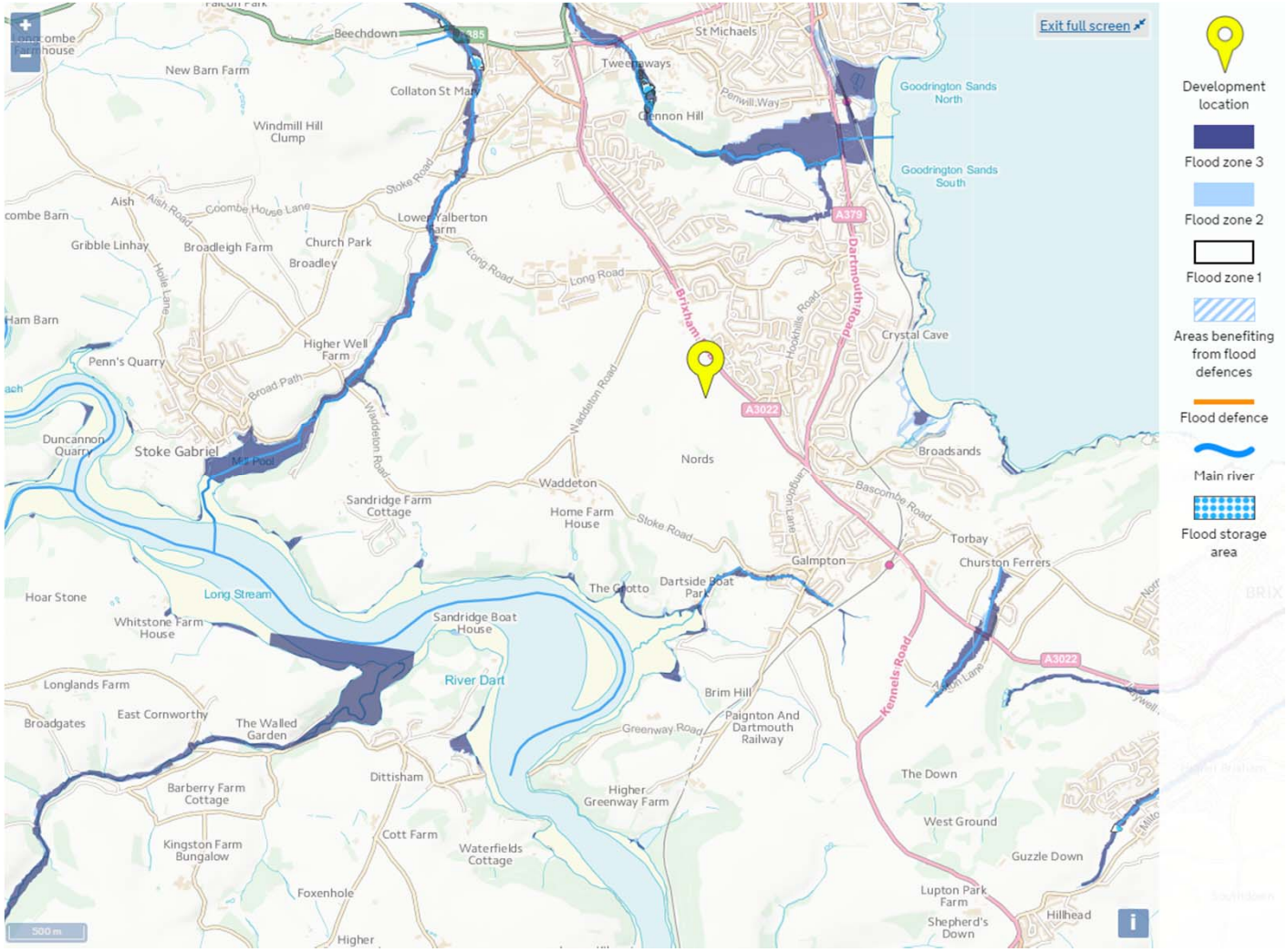
Project: Inglewood, Paignton Flood Risk Assessment and Drainage Strategy		Drawn: GG	Scale: NTS
		Checked: SD	Date: May-17
Title: Hydrological Setting		Map 2	



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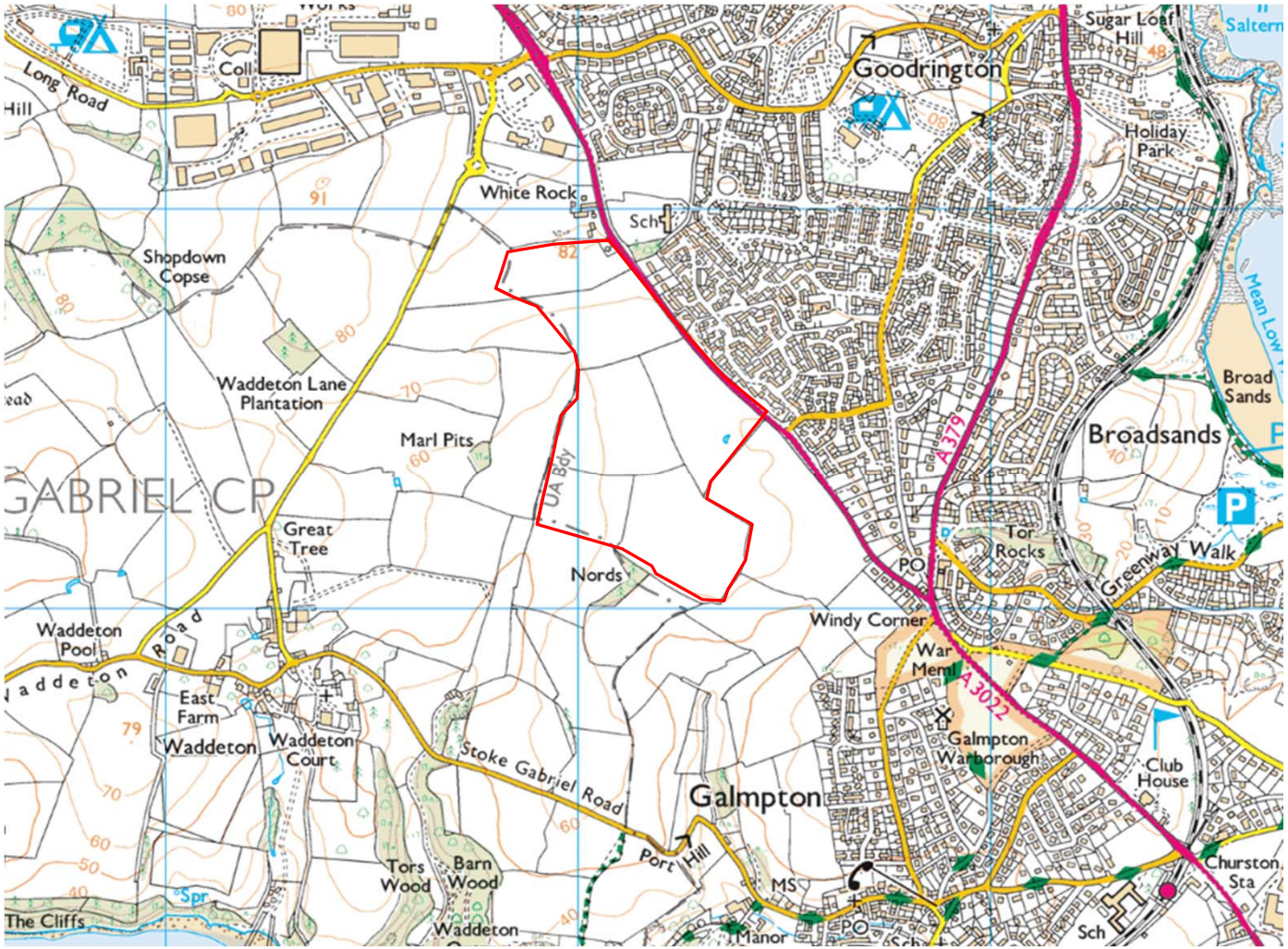
Project:	Drawn:	Scale:
Inglewood, Paignton Flood Risk Assessment and Drainage Strategy	GG	NTS
	Checked: SD	Date: May-17
Title: Flood Map for Planning (Rivers and Sea)	Map 3	



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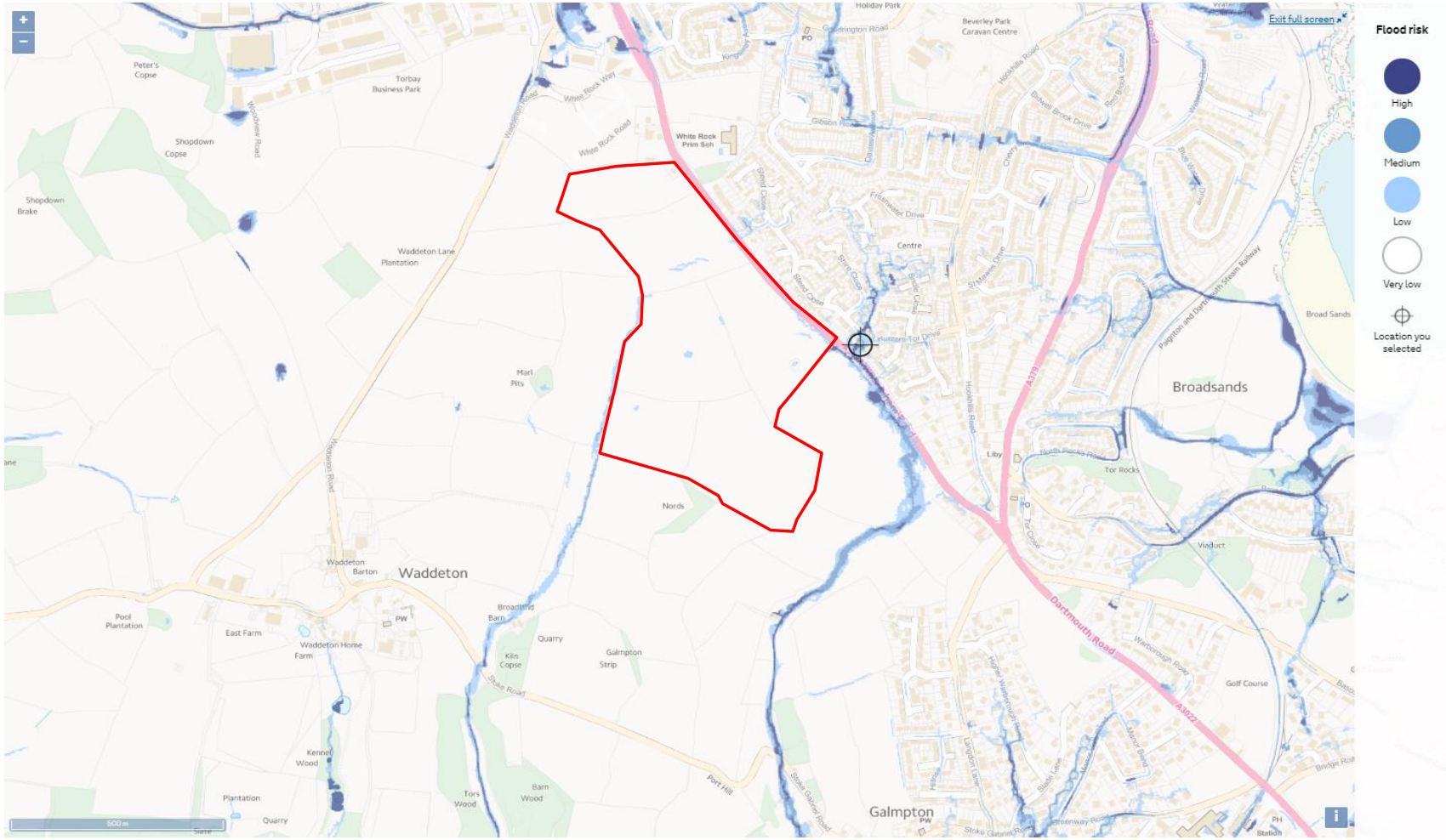
Project:	Drawn:	Scale:
Inglewood, Paignton Flood Risk Assessment and Drainage Strategy	GG	NTS
	Checked: SD	Date: May-17
Title: OS Topographic Contours		Map 4



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Project:	Drawn:	Scale:
Inglewood, Paignton Flood Risk Assessment and Drainage Strategy	GG	NTS
	Checked: SD	Date: May-17
Title: Surface Water Flood Risk	Map 5	

Appendix B – Proposed Development

(1 page)

Revision Notes

Newly planted woodland

Allotments

Pedestrian access to White Rock
(exact location to be determined)

Orchard

Pedestrian
crossing point

Green connection towards
Hookhills Community
Centre Park

PUB

NEAP
play area

Bus
Stops

Landscaped / Rain
Garden Area

Approx line of gas main

LEAP
play area

Mitigation
tree planting

Foul
Pumping
Station

Overhead 11kV line

SCHOOL

New pedestrian crossing
point along Brixham
Road as per KTC drawing
0734-029

Informal
Play Space

Habitat
Area

All Weather Pitch

Countryside access linked
directly to Brixham Road

Mitigation land set
aside for pasture

Hedgerow reinforced
and increased in width

Glimpse
to vista &
countryside
access path

Pedestrian links only
through the existing
hedgerow

Strategic 'green'
countryside access
pedestrian routes

68m

Mitigation
tree planting

LEAP
play area

HEDGEROW KEY:

Existing retained / reinforced

Proposed

Removed

20m wide buffer (no public access)

Mitigation land set
aside for pasture

Mitigation
tree planting

Overhead 11kV line

Mitigation tree planting

The Nords

Mitigation land set
aside for pasture

Inglewood, Paignton
Concept Sketch Masterplan

Drawing Title Concept Sketch Masterplan	Project Inglewood, Paignton
Scale (at A1) 1:1000	Date 27.09.17
Drawn NH	Chk
Drawing No 15230_SK_200	Rev N
Promenade House The Promenade Clifton Down Bristol BS8 3NE	T +44 (0)117 974 3271 E paulseaver @stridetreglown.com

STRIDE TREGLOWN

Appendix C – Flood Risk Policy

(3 pages)

to support economic, environmental and social outcomes. These opportunities are illustrated in an Energy Opportunities Plan, including the potentially most viable locations for district heat networks, which can be found within this evidence base document.

6.5.2 Environmental resources

Policy ER1

Flood risk

Development must be safe for its lifetime, taking account of its future use, function and government projections of how the risk of flooding may change in response to climate change. The sequential approach, as outlined in the National Planning Policy Framework, must be used to guide new development towards sustainable locations, giving priority to sites with the lowest risk of flooding and taking account of the vulnerability of the proposed land uses. Areas subject to flood risk are shown on the Policies Map.

Development proposals will be expected to maintain or enhance the prevailing water flow regime on-site, including an allowance for climate change, and ensure the risk of flooding is not increased elsewhere. Where development is necessary in areas at risk of flooding it should be laid out and designed to ensure buildings and their surroundings are appropriately resistant and resilient to all forms of flooding, would be safe and would not risk flooding third parties. Mitigation measures such as Sustainable Drainage Systems (SuDS) will be required to restrict site discharge rates and encourage biodiversity. SuDS should seek to maximise benefits for amenity, water quality, recreation and biodiversity and take account of the vulnerability and importance of existing ecological resources. A financial contribution may also be requested for capital improvement works to the existing drainage infrastructure.

A Flood Risk Assessment (FRA) will be required for proposals with a site area of 1 hectare or greater within Flood Zone 1, including where they impact on catchments draining into Flood Zones 2 and 3, and for all new development within Flood Zones 2 and 3. Development of basement accommodation or parking will not be permitted where there is danger of inundation and consequent risk to life.

On sites which benefit from existing flood defence schemes, consideration should be given to how the development will be safe and satisfactorily defended for the lifetime of the development, having regard to the future maintenance, modifications and enhancements that will be required to retain the existing level of protection. A financial contribution towards flood defence works may be requested by the Council. Development will be resisted where this requires disproportionate costs for flood defence works, or generates substantial obligations for the public sector.

Development must not result in the loss of access to watercourses, or flood defence assets, for maintenance, clearance, repair or replacement.

Proposals which provide functional improvements to a floodplain, open up culverts or restore the natural characteristics of catchments will be promoted and encouraged, particularly where this reduces flood risk, improves water quality, maintains water resources, enhances biodiversity, or produces other benefits, such as improved amenity or provision for recreation.

Explanation:

6.5.2.1 This Policy seeks to avoid inappropriate development in areas subject to flooding, and to direct development away from areas of highest risk. Events in Torbay and elsewhere have shown the disruption and distress caused by flood events which, at worst, can lead to the loss of life and damage to property.

6.5.2.2 The risk from flooding is very low in most parts of Torbay. But due to the Bay's topography, climate, proximity to the sea, nature of watercourses and sewers, flooding can occur rapidly giving people little time to react. It is therefore particularly important that new development considers flood risk.

6.5.2.3 Indicative flood risk zones are shown on the Policies Map. However, they are not intended to be definitive and it is the responsibility of the applicant to ensure that proposals meet the requirements of the Local Plan and NPPF. More detailed information can be found in the Strategic Flood Risk Assessment (SFRA). Most of the coastal fringe and land adjacent to watercourses is within a medium or high risk flood area – Flood Zones 2 and 3. This includes parts of Brixham, Paignton and Torquay Town Centres, Higher Brixham, Torquay waterfront, Torre Abbey Meadows, parts of Preston and Goodrington, Occombe and Clennon Valleys, Broadsands, Kings Ash Road, Totnes Road, Churston and Galmpton. Policy C3 also relevant to such areas.

6.5.2.4 The greatest risk of tidal flooding coincides with extreme storms, high tides and easterly winds. This could potentially lead to the local overtopping or breach (failure) of existing flood defences. Fluvial flood events have tended to arise where rainfall exceeds the capacity of watercourses, or as a result of problems within culverts. A key factor influencing the magnitude of fluvial flood events is the steep topography present in much of Torbay.

6.5.2.5 There is sufficient land within Flood Zone 1, where the probability of flooding is low, in order to deliver the majority of the future growth identified by the Local Plan.

6.5.2.6 A sequential test should be undertaken, in accordance with the Technical Guidance to the National Planning Policy Framework, to ensure that land uses, such as residential, are appropriately located. Developers should have regard to the potential for flood risk now and in the future, when undertaking the sequential test, as set out in Torbay's Strategic Flood Risk Assessment(SFRA). When undertaking the sequential test, consideration should be given to the local flooding characteristics identified in the Council's Level 1 and 2 *"Strategic Flood Risk Assessment"* (SFRA) and to the *"Strategic Housing Land Availability Assessment"* (SHLAA). Where the Exception Test is applied, preference will be given to proposals able to demonstrate significant regeneration benefits or lead to the achievement of Local Plan objectives.

6.5.2.7 The Level 1 SFRA shows the extent and distribution of flood risk through a series of flood maps. The maps highlight the risk of fluvial and tidal flooding events. The SFRA also sets out the circumstances in which surface water, sewer and groundwater flooding may be an issue.

6.5.2.8 The Level 2 SFRA provides greater detail about the flood risk characteristics within the major flood risk areas identified by the Level 1 assessment, drawing on the results from tidal and fluvial modelling. It examines the consequences of overtopping or a breach (failure) of flood defences by mapping the potential depth of floodwater and the severity of the flood hazard, taking account of flood velocity. The Level 2 SFRA provides clear guidance on the risk management measures which should be adopted, in order to mitigate flood risk.

6.5.2.9 For all development (including changes of use) in Flood Zones 1, 2 or 3, the Council will work with developers to seek opportunities to reduce the overall risk of flooding in the area and beyond through the layout and form of development, including Sustainable Drainage Systems and green infrastructure. The opportunity to reduce the vulnerability of existing basement flats in areas of flood risk will be particularly encouraged. Changes of use of existing basements to 'more' and 'highly' vulnerable uses will not be acceptable. Similarly, the reorientation of existing residential accommodation that would result in self contained basement dwelling(s) will not be permitted where there would be no unfettered access to high ground, or higher floors that are above potential flood levels within the building in question.

6.5.2.10 The South Devon Catchment Flood Management Plan contains long term actions to reduce the number of people and properties at risk from inland flooding.

6.5.2.11 The Torbay Strategic Housing Land Availability Assessment does not distinguish between sites according to flood risk; however it does provide a useful reference source in indicating the supply of reasonably available land for housing outside the high and medium flood risk areas.

6.5.2.12 It is recognised that the intense pressure on Torbay's finite land supply will mean some development will continue to occur in flood risk areas, and this will help to sustain the vitality of the existing urban area and contribute to the regeneration of the local economy. The acceptability of such proposals will be determined with regard to the compatibility of land uses in the Technical Guidance to the National Planning Policy Framework, and the specific package of mitigation measures being proposed. Such developments must be safe over their lifetime and take into account the effects of climate change (also see Policy SS13).

6.5.2.13 The Council will require developers to enter into a legal agreement securing the provision of Sustainable (Urban) Drainage Systems (SuDS), where technically feasible, to control surface water run-off, safeguard and improve the quality of rivers, coastal waters and groundwater and protect and enhance biodiversity, amenity or recreation. The amount and rate of water flowing off the development site must not be greater than the situation prior to development.

6.5.2.14 The Torbay Green Infrastructure Delivery Plan demonstrates some of the opportunities present in Torbay for the enhancement, restoration and creation of habitats for wildlife, such as wetlands and reedbeds which can collect, store and filter dirty water, provide a habitat for wildlife and a natural form of flood defence. Ensuring that more development schemes provide Sustainable Drainage Systems will helps towards reducing the likelihood of urban sewer flooding.

6.5.2.15 The Government has stated that individuals and businesses that benefit the most from flood defences (e.g. by lower insurance premiums and averted damage) should pay a greater proportion towards their cost, giving effect to the 'beneficiary pays principle' (DEFRA, 2010). A financial contribution for the maintenance and improvement of flood defence infrastructure will be requested where it protects a proposed development, or makes a development feasible, which otherwise, could not be permitted.

6.5.2.16 New development will need to be designed and constructed to minimise flood risk e.g. by the careful layout of land uses and activities to ensure flood resilience and resistance. Safe access, escape routes, refuge areas and evacuation plans may need to be provided. Where a development site has different flood risk characteristics (e.g. straddles flood zones), vulnerable uses should be directed to the part of the site with the lowest flood risk. Particular care will need to be taken with proposals to provide new basement accommodation or underground car parking, as these uses are particularly difficult to defend. Development is unlikely to be permitted where there is a danger of inundation of such areas, as this poses a danger to life.

Appendix D – Topographic Survey

(1 page)

CDM RESIDUAL RISKS

The work shown on this drawing is both familiar to the designers and routinely safely built in similar circumstances by competent contractors.

Risks are not considered significant.

Relevant data is included in the Pre-Construction Information Pack

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LEGEND

Ridge Lines

Direction of Fall

Rev	Detail	By	Chk	Date
*	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

Client

Project: Inglewood, Paignton

Drawing Status: Information

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Bristol Exeter London

Drawing Title: Topographic Survey

Project No.	Discipline	Drawing No.
WB03590	C	01

Scale	Date	Revision
1:3000	28.03.17	*

Drawn	Checked	Sheet Size
GG	SD	A3

DWG INFO: M:\CLARKEBOND UK LIMITED\BRISTOL PROJECTS\WB03590 - WHITE ROCK 2 URBAN EXTENSION\PRODUCTION\DATA - CB INTERNAL\REPORTS\FRA\DRAINAGE DIRECTION

Appendix E – South West Water Sewer Maps

(7 pages)

Sewerage Pipe Details

Examples of the abbreviation details above a Sewer Pipe (details will be in the same colour as the pipe itself):

A B C D
Cir / 225 / VC / 82

A: Shape
B: Diameter (replaced by width & length on non-circular pipes
C: Material
D: Gradient (1: number shown)

Public - Foul
Public - Surface
Public - Combined
Public - Treated
Private Sewer
Unverified

Highway
Abandoned Sewer A
Pumping Main
Elevated Sewer /EL
Syphon S

Shapes

Circular Cir	Rectangular Rec	Barrel Brl	Trapezodial Trpz
U Shaped UShp	Horseshoe Hsho		

Materials

Vitrified Clay VC	Clay (Salt Glaze) SG	Pre-cast Concrete PCO	Concrete CO
Asbestos Cement AC	Brick BR	Stone (Masonry) MAC	Alkathene AK
Steel ST	Concrete Box CB	Glass Reinforced Plastic GRP	Plastic PL
Polypropylene PP	Unplasticised Polyvinylchloride UPVC	Polyethylene PE	Polyvinylchloride PVC
Concrete Segments Bolted CSB	Pitch Fibre PF	Concrete Segments Unbolted CSU	Medium Density Polyethylene MDPE
Not Known NK			

Sewerage Structures (shown in common colours)

Manhole Foul / Trade	Manhole Surface	Manhole Private	Manhole Combined
Soakaway SK	Washout WO	Catchpit CP	Hatchbox HB
Flushing FC	Lamphole LH	Tank Online TN	Tank Offline TO
Septic Tank S	Cesspit C	Header E	Drain LD
Reflux Valve RV	Sluice Valve	Air Valve AV	Venting Pole VP
Storm Overflow SO		Undefined Connection	Side Entry
Outfall OF		Backdrop	

Sewerage Installations

Pumping Station	Treatment Works WWTW

Details on Covers

Lockable k	Gas / Water Tight t	Bolted b

Location

Buried BL	Unable to Locate UL

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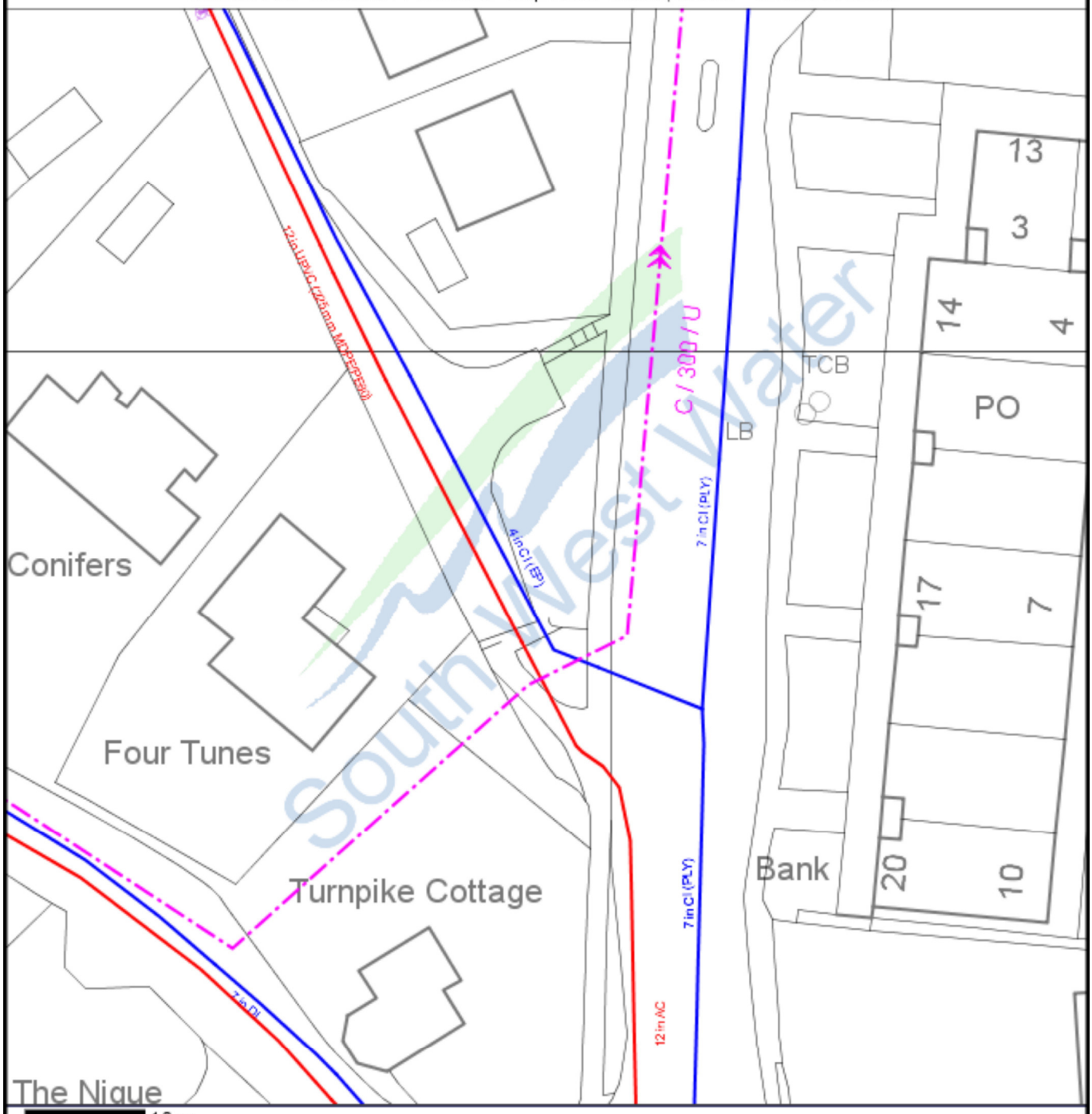

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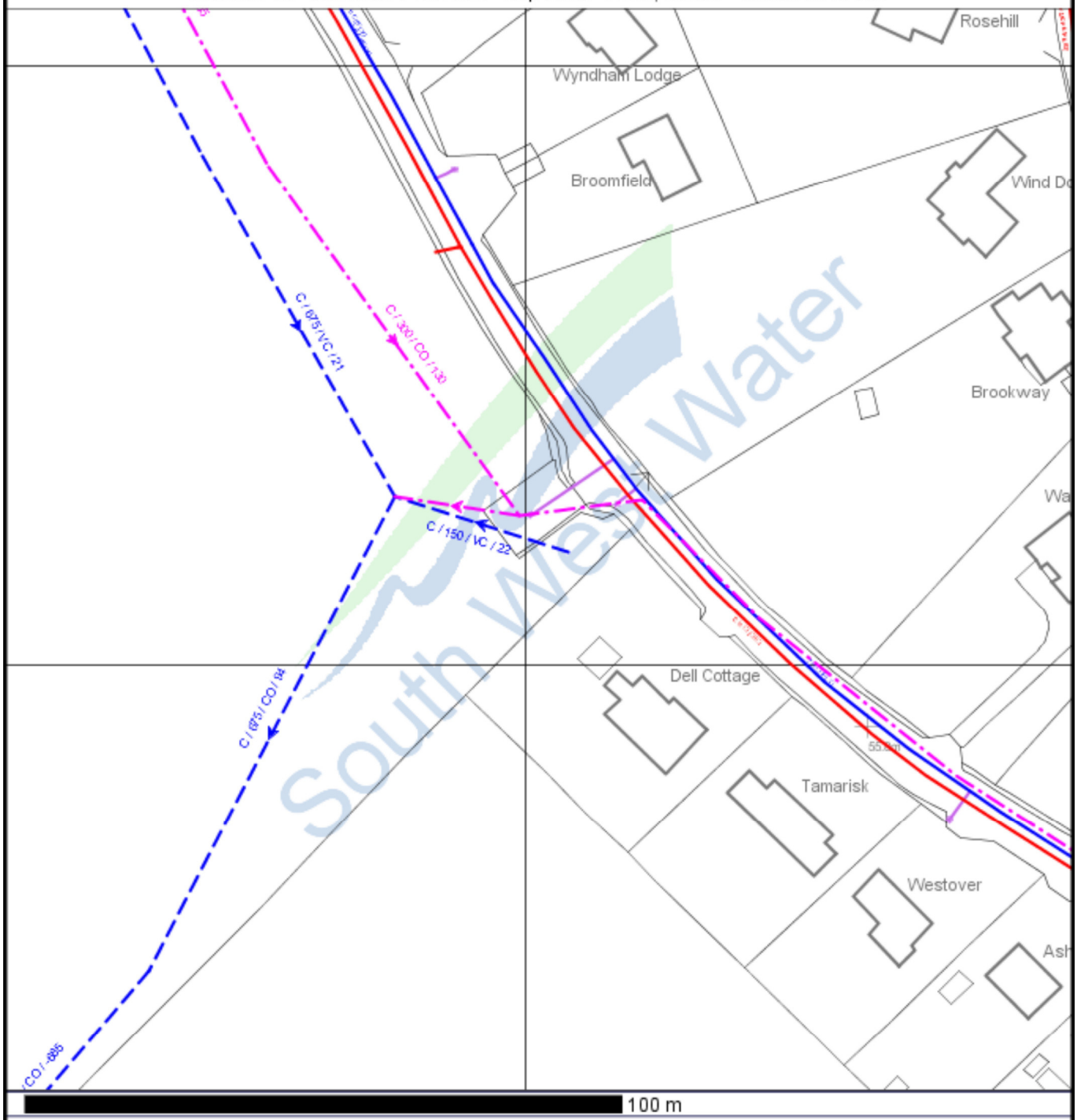

SOUTH WEST WATER

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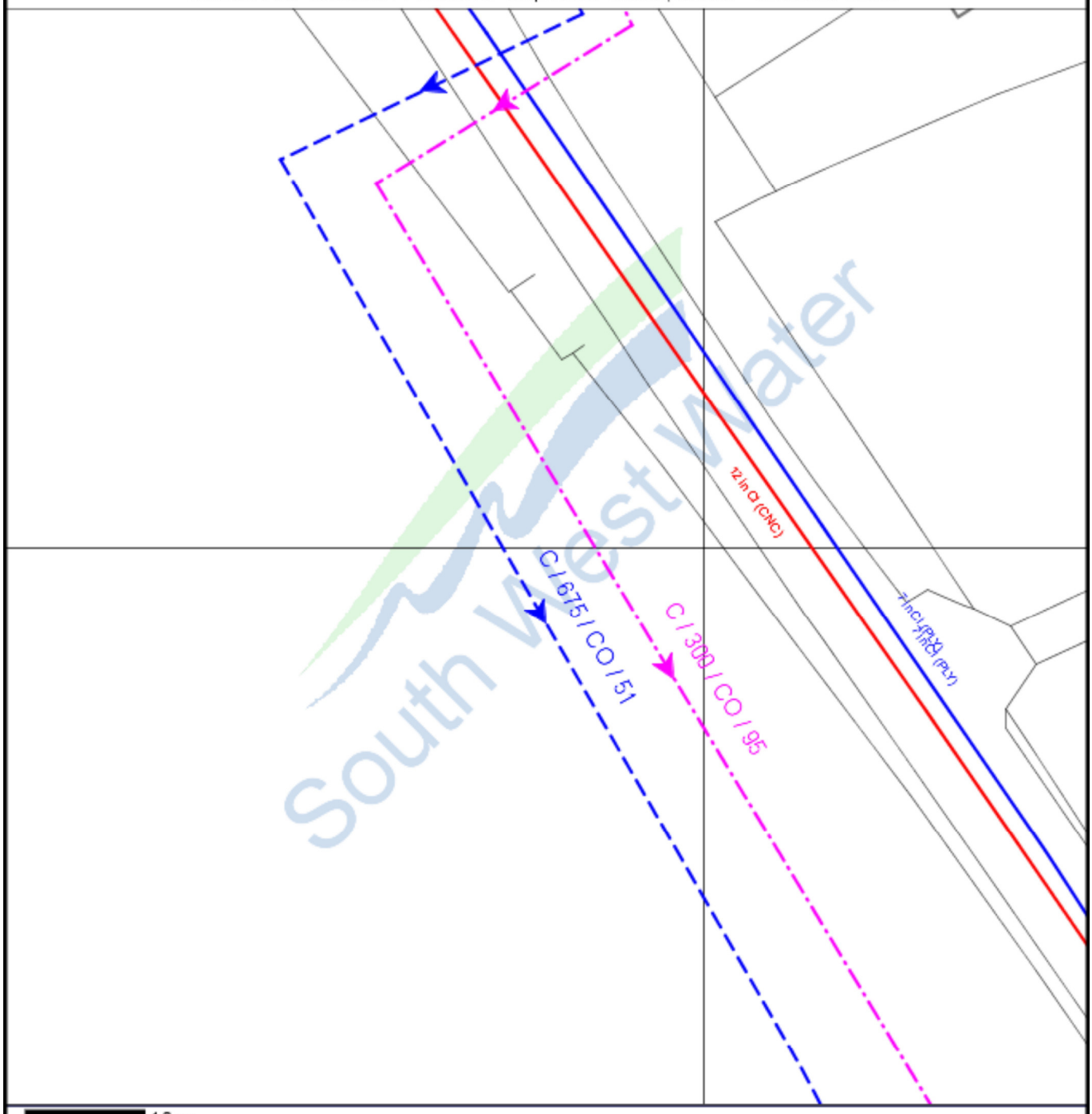

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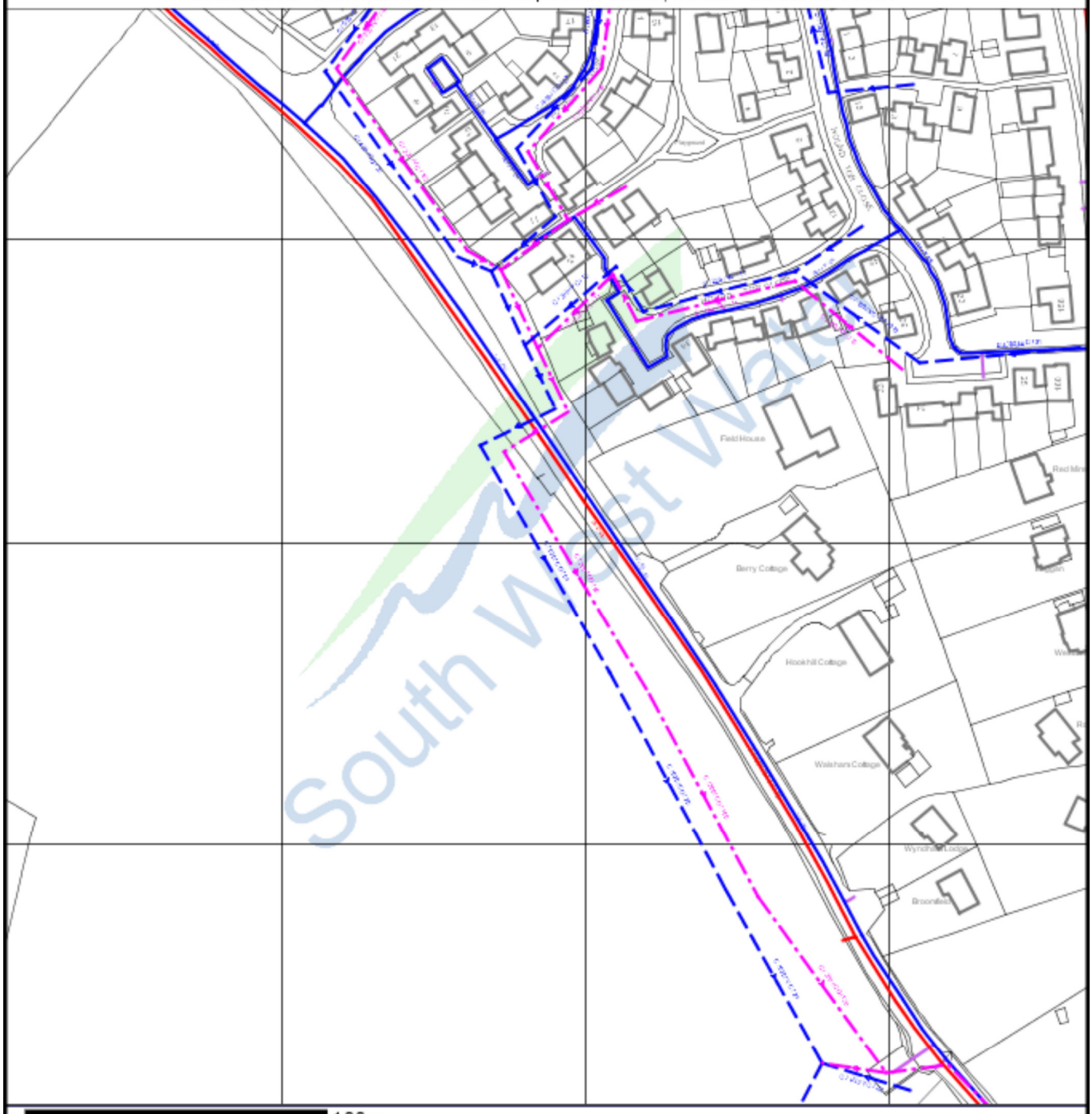

100 m

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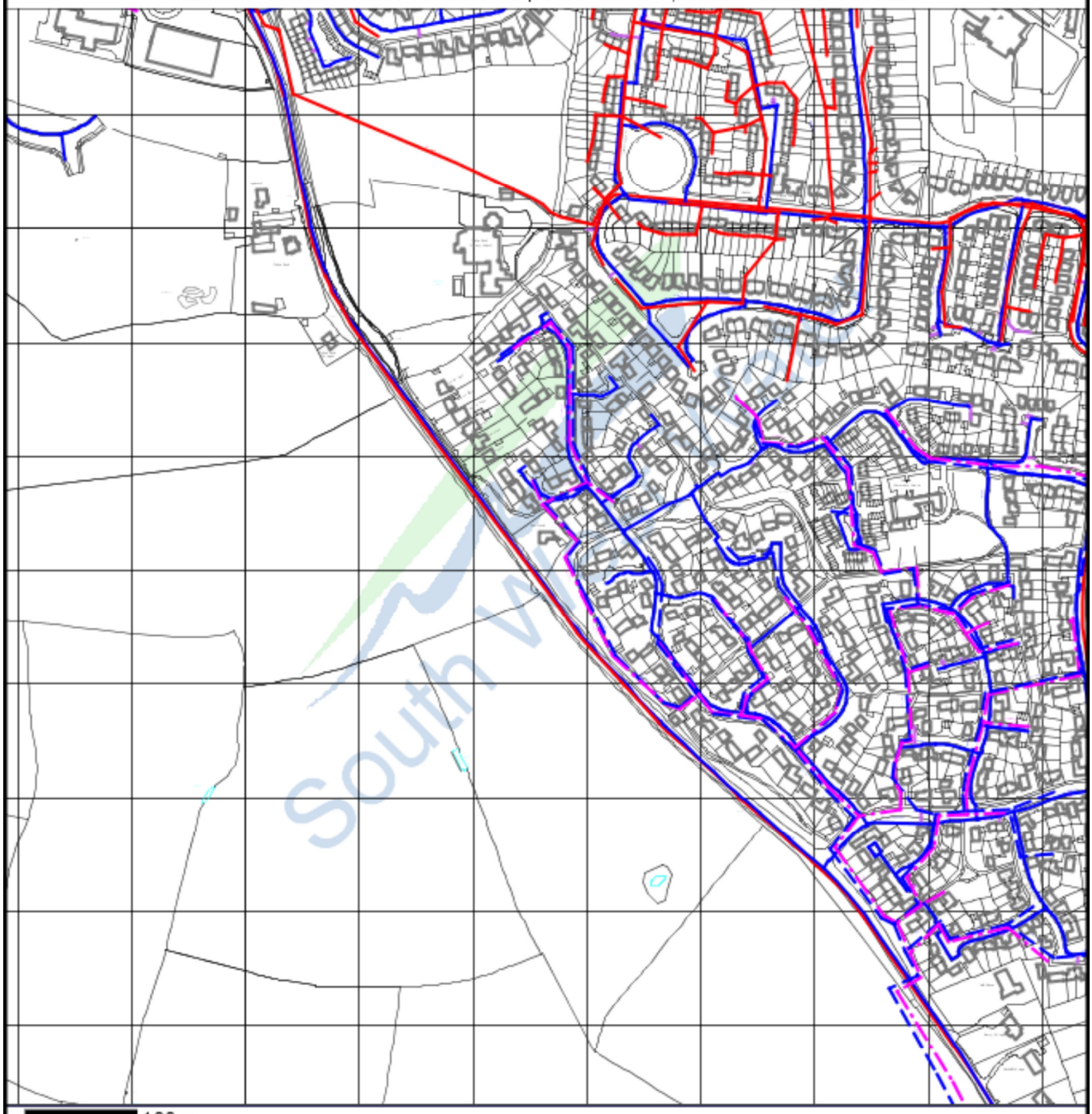

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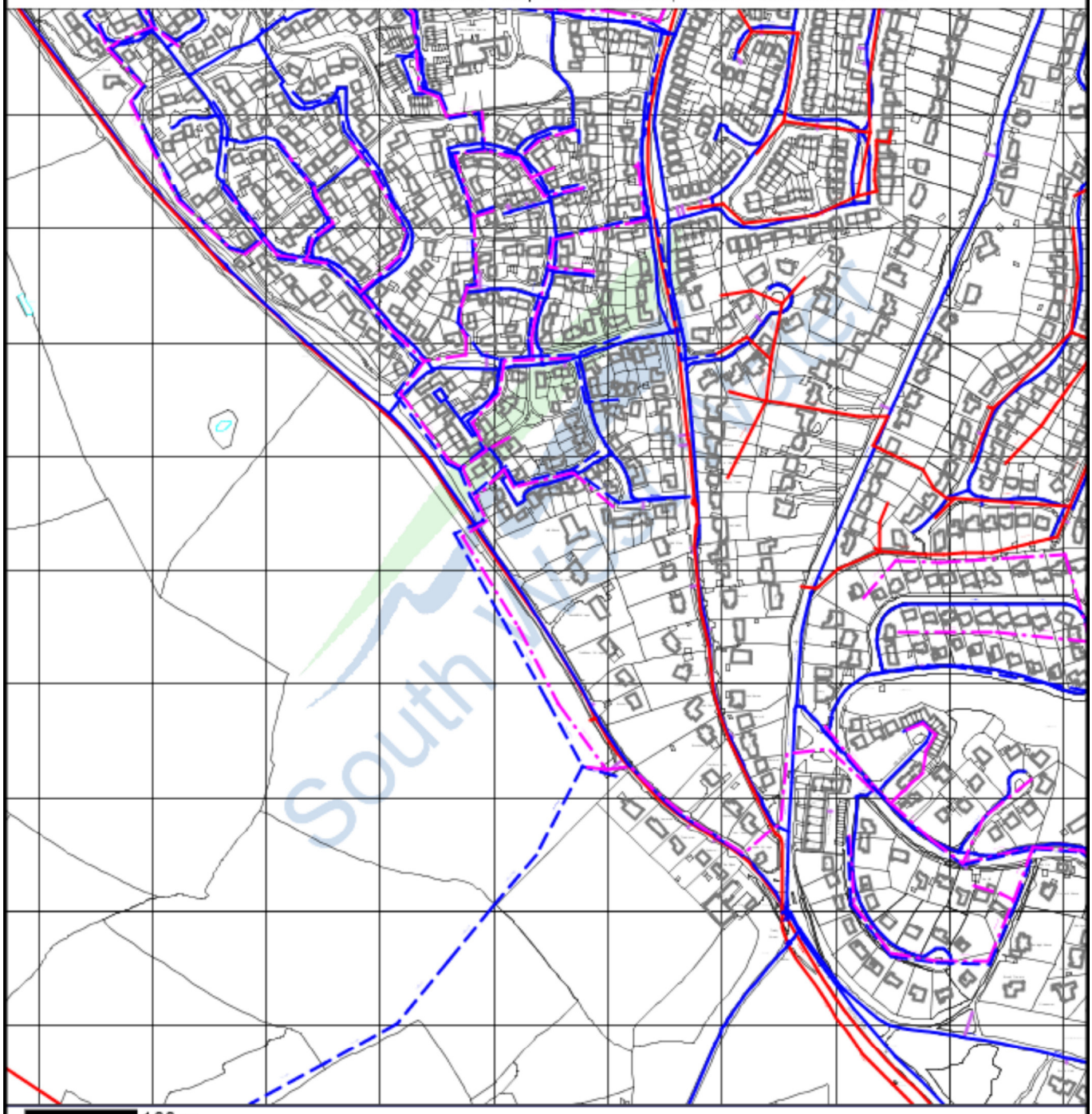

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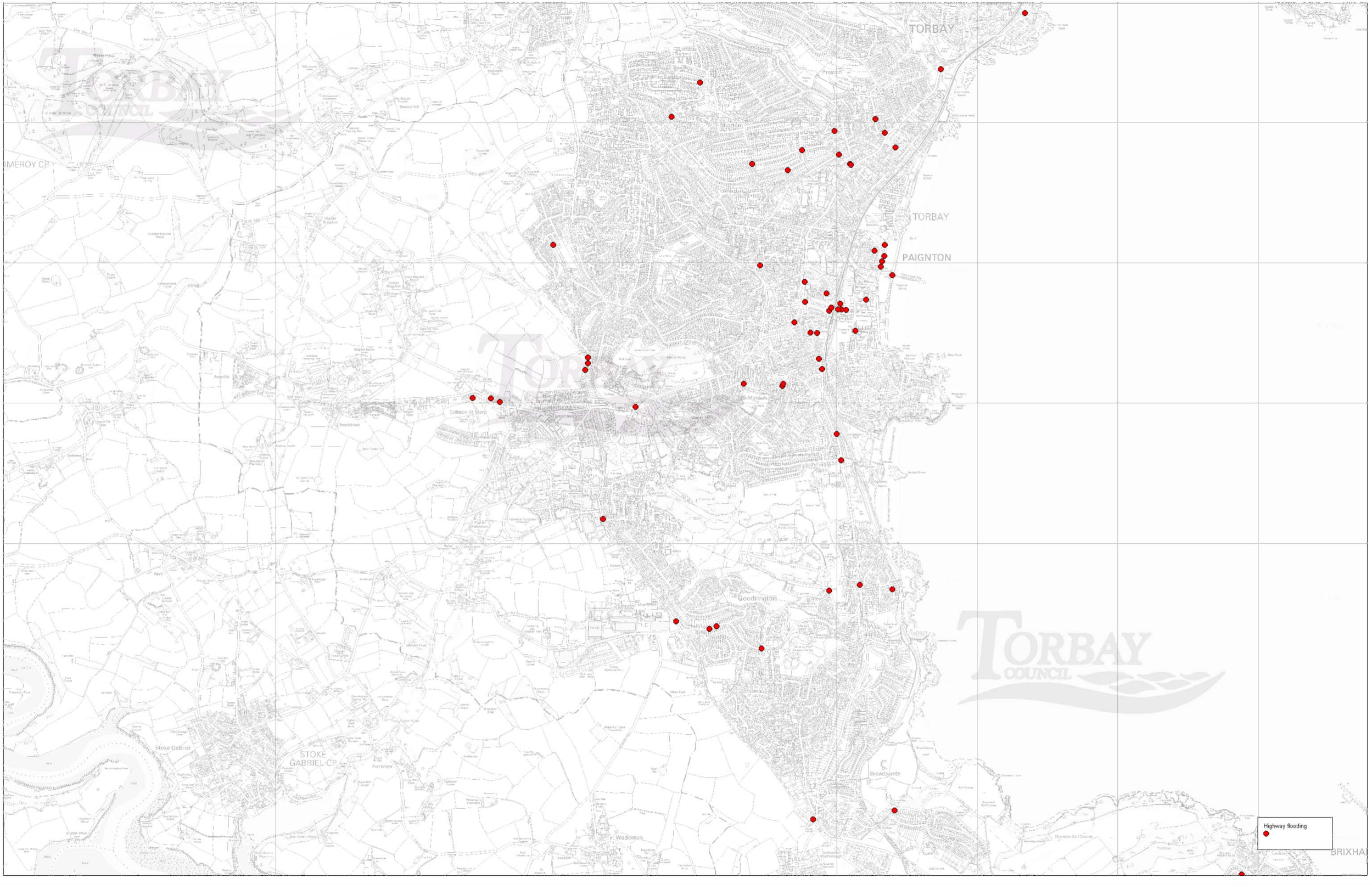
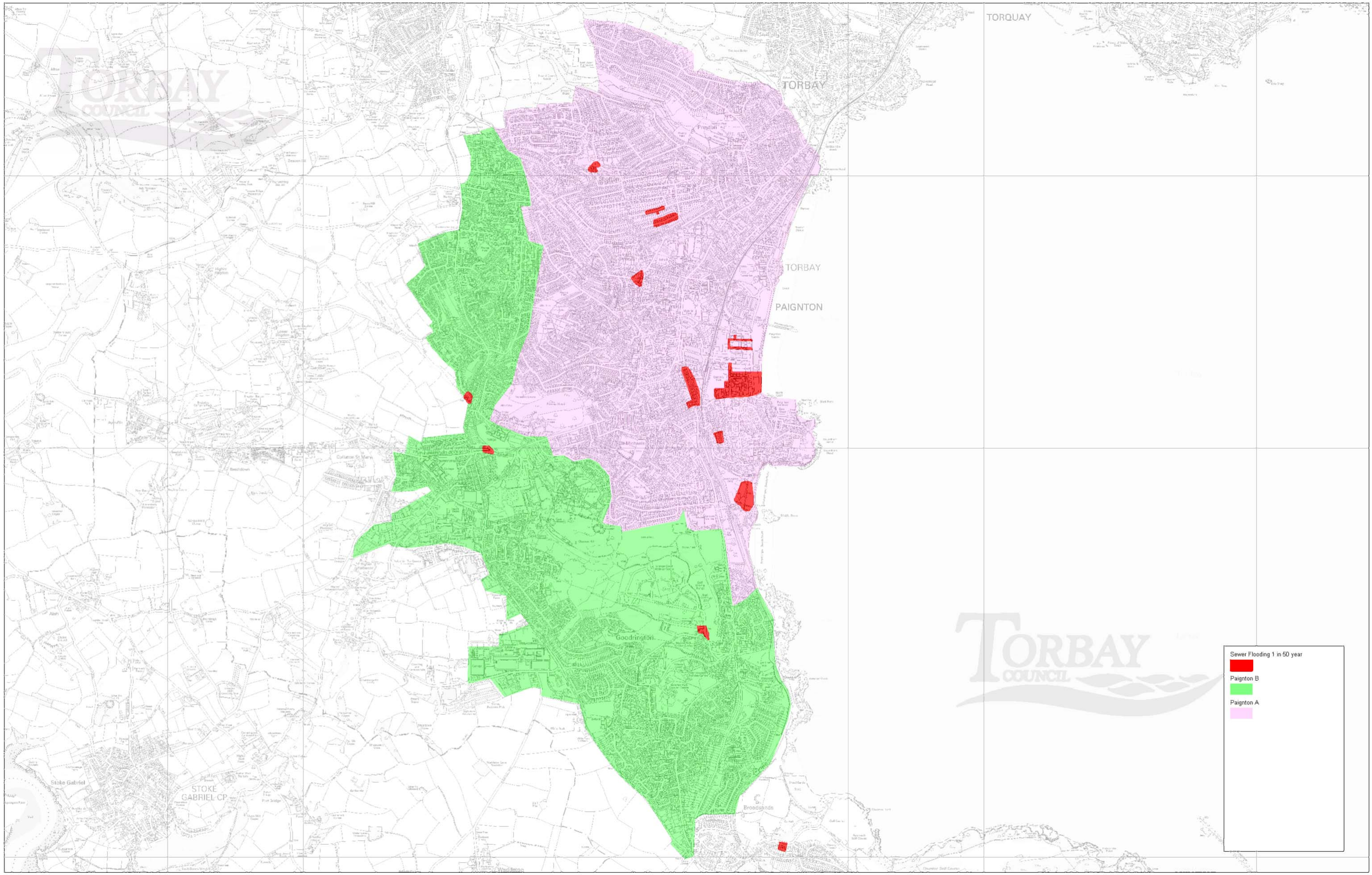
Appendix F – SFRA Flood Maps

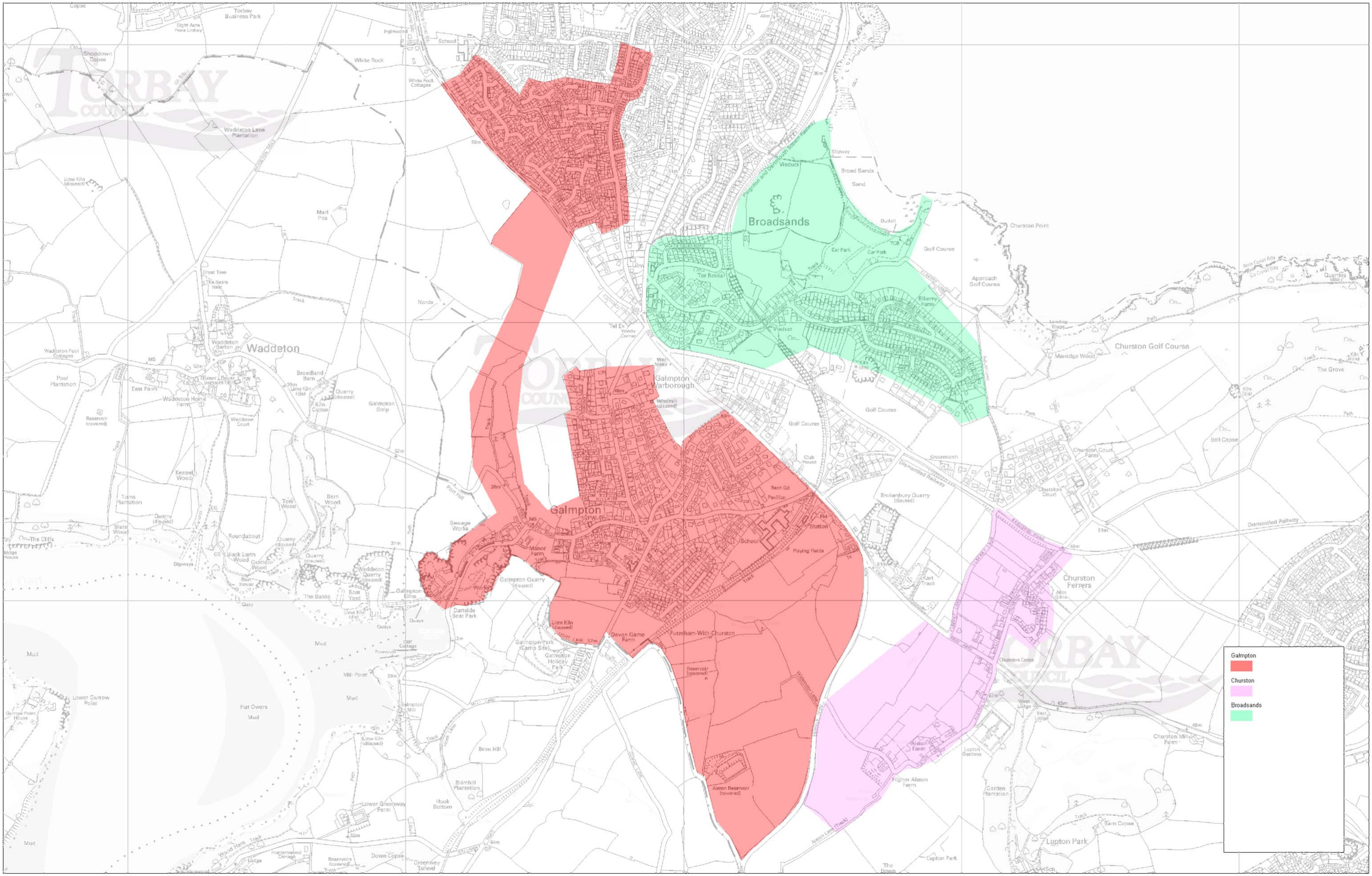
(3 pages)



PAIGNTON - Locations of Historic Highway Flooding TC/9/7/15 - 4/5



PAIGNTON - Sewer Catchment Areas and Flood Risk Areas TC/9/7/15 - 8/2



GALMPTON - Catchment Areas TC/9/7/15 - 5/2

Appendix G – Trial Pit Locations

(1 page)

CDM RESIDUAL RISKS

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Risks are not considered significant.

Relevant data is included in the Pre-Construction Information Pack

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N

TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP101
TP102
TP103
TP104

Trial Pit Location

0 50 100 200

SCALE 1:2000 (A3) METRES

Rev	Detail	By	Chk	Date
*	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

Client: Deeley Freed Estates Ltd

Project: Inglewood, Paignton

Drawing Status: Final

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Bristol Exeter London

Drawing Title: Exploratory Hole Location Plan

Project No.	Discipline	Drawing No.
WB0590	G	3.1

Scale	Date	Revision
1:2000	May 17	*

Drawn	Checked	Sheet Size
HG	CW	A3

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Appendix H – Drainage Strategy

(5 pages)

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The work shown on this drawing is both familiar to the designers and routinely safely built in similar circumstances by competent contractors.

Risks are not considered significant.

Relevant data is included in the Pre-Construction Information Pack

Signed: .. **Date:** .....

DO NOT SCALE THIS DRAWING FOR CONSTRUCTION PURPOSES.

CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ENGINEER

N

DRAWING 601

DRAWING 602

DRAWING 603

DRAWING 604

FOR OUTFALL SEE DRAWING 602

PRIVATE SCHOMBWY BASIN
DEPTH: 1m+0.3m FREEBOARD
PLAN AREA: 1099m²

HIGHWAY SCHOMBWY BASIN
DEPTH: 1m+0.3m FREEBOARD
PLAN AREA: 1452m²

ATTENUATION TANK
DEPTH: 1.20m
PLAN AREA: 1496m²

ATTENUATION BASIN
DEPTH: 1.0m+0.3m FREEBOARD
PLAN AREA: 1326m²

0 10 20 30 40 50 60 70 80 90 100
SCALE 1:1000 (A1) METRES

Rev	Detail	By	Chk	Date
C	DRAINAGE LAYOUT AMENDED TO MATCH NEW MASTERPLAN.	JP	AJ	10.10.17
B	DRAINAGE LAYOUT AMENDED TO MATCH NEW MASTERPLAN.	JP	AJ	09.06.17
A	PUMPING STATION LAYOUT ADDED	JP	AJ	24.05.17
*	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

Client: ABACUS / DEELEY FREED

Project: INGLEWOOD URBAN EXTENSION

Drawing Status: INFORMATION

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Bristol Exeter London

Drawing Title: DRAINAGE LAYOUT

OVERVIEW

Project No.	Discipline	Drawing No.
WB03590	C	600
Scale: 1/1000	Date: 28.08.2017	Revision: C
Drawn: JP	Checked: AJ	Sheet Size: A1

DWG INFO: M:\CLARKEBOND UK LIMITED\BRISTOL PROJECTS\WB03590 - WHITE ROCK 2 URBAN EXTENSION\DRAWINGS\CURRENT\WB03590-C-600C,601B,602B,603C,604B (DRAINAGE LAYOUT)

CDM RESIDUAL RISKS

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CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ENGINEER

KEY

DRAINAGE:

- PROPOSED SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED HIGHWAY WATER SEWER
- PROPOSED FOUL WATER RISING MAIN
- PRIVATE ON PLOT SOAKAWAYS
- SWRO SHARED PRIVATE ON PLOT SOAKAWAY (2 PLOTS UNLESS OTHERWISE STATED)
- PROPOSED PERMEABLE PAVING

Rev	Detail	By	Chk	Date
B	DRAINAGE LAYOUT AMENDED TO MATCH NEW MASTERPLAN.	JP	AJ	10.10.17
A	DRAINAGE LAYOUT AMENDED TO MATCH LATEST MASTERPLAN.	JP	AJ	09.06.17
*	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

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Client
ABACUS / DEELEY FREED

Project
INGLEWOOD
URBAN EXTENSION

Drawing Title
DRAINAGE LAYOUT

SHEET 4

Drawing Status
INFORMATION

Project No.	Discipline	Drawing No.
WB03590	C	604

Scale	Date	Revision
1/500	28.04.2017	B

Drawn	Checked	Sheet Size
JP	AJ	A1

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Signed: .. **Date:** .....

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KEY

DRAINAGE:

- PROPOSED SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED HIGHWAY WATER SEWER
- PROPOSED FOUL WATER RISING MAIN
- PRIVATE ON PLOT SOAKAWAYS
- SHARED — SHARED PRIVATE ON PLOT SOAKAWAY (2 PLOTS UNLESS OTHERWISE STATED)
- PROPOSED PERMEABLE PAVING

Rev	Detail	By	Chk	Date
C	DRAINAGE LAYOUT AMENDED TO MATCH NEW MASTERPLAN.	JP	AJ	10.10.17
B	DRAINAGE LAYOUT AMENDED TO MATCH LATEST MASTERPLAN. SCHOOL SOAKAWAY ADDED.	JP	AJ	09.06.17
A	PUMPING STATION LAYOUT ADDED	JP	AJ	24.05.17
*	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

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Bristol Exeter London

Client
ABACUS / DEELEY FREED

Project
INGLEWOOD
URBAN EXTENSION

Drawing Title
DRAINAGE LAYOUT

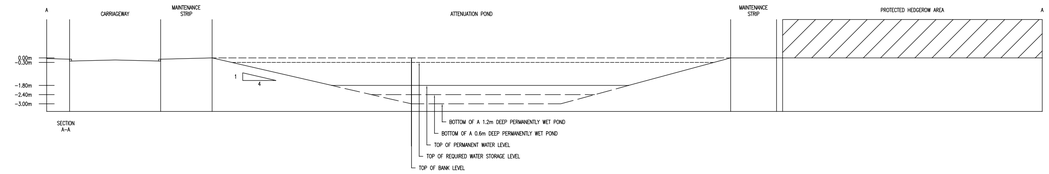
SHEET 3

Drawing Status
INFORMATION

Project No.	Discipline	Drawing No.
WB03590	C	603

Scale	Date	Revision
1/500	28.04.2017	C

Drawn	Checked	Sheet Size
JP	AJ	A1



SECTION THROUGH POND
SCALE 1:250

CDM RESIDUAL RISKS

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KEY

DRAINAGE:

- PROPOSED SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED HIGHWAY WATER SEWER
- PROPOSED FOUL WATER RISING MAIN
- PRIVATE ON PLOT SOAKAWAYS
- SHARED PRIVATE ON PLOT SOAKAWAY (2 PLOTS UNLESS OTHERWISE STATED)
- PROPOSED PERMEABLE PAVING
- ASSUMED PLOT BOUNDARY

NOTES:

Rev	Detail	By	Chk	Date
B	DRAINAGE LAYOUT AMENDED TO MATCH NEW MASTERPLAN. NOTE ADDED ABOUT OUTFALL LEVELS.	JP	AJ	10.10.17
A	ATTENUATION POND AMENDED. SECTION THROUGH POND ADDED.	JP	AJ	09.06.17
-	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

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Bristol Exeter London

Client: ABACUS / DEELEY FREED

Project: INGLEWOOD URBAN EXTENSION

Drawing Title: DRAINAGE LAYOUT

SHEET 2

Drawing Status: INFORMATION

Project No.	Discipline	Drawing No.
WB03590	C	602

Scale	Date	Revision
1/500	28.04.2017	B

Drawn	Checked	Sheet Size
JP	AJ	A1

CDM RESIDUAL RISKS

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KEY

DRAINAGE:

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- PROPOSED FOUL WATER SEWER
- PROPOSED HIGHWAY WATER SEWER
- PROPOSED FOUL WATER RISING MAIN
- PRIVATE ON PLOT SOAKAWAYS
- SHARED PRIVATE ON PLOT SOAKAWAY (2 PLOTS UNLESS OTHERWISE STATED)
- PROPOSED PERMEABLE PAVING

Rev	Detail	By	Chk	Date
B	DRAINAGE LAYOUT AMENDED TO MATCH NEW MASTERPLAN.	JP	AJ	10.10.17
A	DRAINAGE AMENDED FOR LATEST MASTERPLAN. SCHOOL SOAKAWAY ADDED	JP	AJ	09.06.17
*	PRELIMINARY FIRST ISSUE.	..	..	.....

Revisions

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Bristol Exeter London

Client: ABACUS / DEELEY FREED

Project: INGLEWOOD URBAN EXTENSION

Drawing Title: DRAINAGE LAYOUT

SHEET 1

Drawing Status: INFORMATION

Project No.	Discipline	Drawing No.
WB03590	C	601

Scale	Date	Revision
1/500	28.04.2017	B

Drawn	Checked	Sheet Size
JP	AJ	A1

0 10 20 30 40 50 METRES

SCALE 1:500 (A1)

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