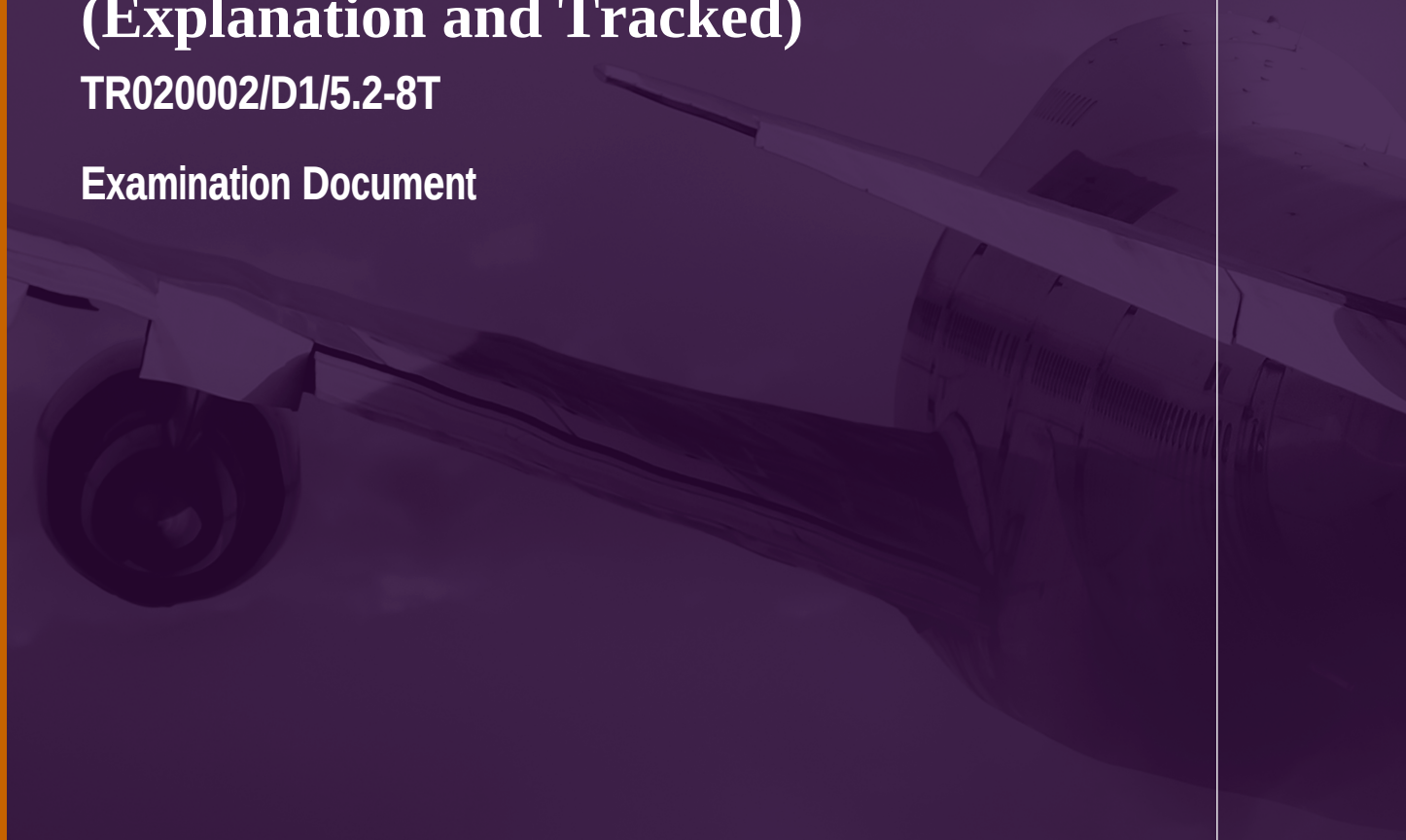
RiverOak Strategic Partners

Updated 5.2-8 Environmental Statement Volume 8: Appendices 8.2 - 9.1 Part 1 (Explanation and Tracked)

TR020002/D1/5.2-8T

Examination Document



Project Name:	Manston Airport Development Consent Order
Application Ref:	TR020002
Submission Deadline:	**1**
Date:	18 January 2019

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER

APPLICATION REF TR020002

ENVIRONMENTAL STATEMENT – VOLUME 8 – APPENDICES 8.2 – 9.1 (PART 1)

EXPLANATION AND TRACKED CHANGE VERSION FOR DEADLINE 1

Explanation of changes

1. This document first sets out the changes that have been made to Volume 8 of the Environmental Statement (Examination Library reference APP-048) in response to the Examining Authority's comments in the Rule 6 letter (ref PD-005) and in response to comments made at the Preliminary Meeting on 9 January 2019 and Issue Specific Hearing on 10 January 2019.

Confirmation of intentions for the RAF Manston Museum and for the Spitfire and Hurricane Memorial Museum

2. Paragraph 3.1.11 of the Flood Risk Assessment (APP-048) has been amended to remain consistent with the description in Paragraph 3.3.104 of the ES (APP-033). The RAF Manston Museum and the Spitfire and Hurricane Memorial Museum will remain on site, with an area of land being safeguarded for these facilities.

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Volume 8A Contents

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Volume 8B Contents

Appendix 9.1 Part 1 Archaeological Desk Based Assessment

RiverOak Strategic Partners

Manston Airport DCO

Flood Risk Assessment

March 2018

Amec Foster Wheeler Environment
& Infrastructure UK Limited

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Document revisions

No.	Details	Date
i1	Draft for review	November 2017
i2	Final for review	November 2017
i3	Final for PEIR	January 2017
i4	Draft for ES	February 2018
i5	Final for ES	March 2018

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1. Introduction

1.1 Context

1.1.1 This Flood Risk Assessment (FRA) is submitted on behalf of RiverOak Strategic Partners ('RiverOak') who are seeking consent for the re-opening of Manston Airport (the Proposed Development) through a Development Consent Order (DCO).

1.1.2 A Preliminary Environmental Information Report (PEIR) was prepared by RiverOak and consulted upon in Summer 2017 (PEIR, 2017) by RiverOak as part of the consultation process and, amongst other things, it addressed the water environment. Following the introduction of the Infrastructure Planning (Environmental Impact Assessment) Regulations (the 2017 EIA Regulations) a revised PEIR (PEIR, 2018) was prepared reflecting the latest available information and introducing a number of additional topics in accordance with the 2017 EIA Regulations.

1.1.3 Following the 2018 PEIR and taking into account the responses of consultees, an Environment Statement (ES) has been prepared.

1.1.4 This FRA has been prepared in support of **Chapter 8: Freshwater Environment** of the ES.

1.1.5 The development proposals for the Proposed Development are set out in **Chapter 3: Description of the Proposed Development** of the ES.

1.1.6 This FRA has been prepared in accordance with the Revised Draft Airports National Planning Statement (NPS), National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) on flood risk and coastal change[1]. With regard to flood risk, the NPS repeats the advice set out in the NPPF. The NPS states (at paragraph 5.150) that a site-specific FRA is required for development proposals of 1 hectare or greater in Flood Zone 1, all proposals for new development located in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency (EA)).

1.1.7 The EA Flood Risk map classifies 100% of the site as being in Flood Zone 1, defined as having a less than 0.1 % annual exceedance probability (AEP) of fluvial or tidal flooding. However, the site is larger than 1ha and therefore, an FRA is required. No watercourses (Main River or Ordinary Watercourse) pass through or run alongside the site. At present surface water from the site drains to the coast at Pegwell Bay, or is discharged into surface water sewers.

1.1.8 The main purpose of this FRA, as detailed in the NPS and NPPF, is to demonstrate how flood risk to the Proposed Development and any increased flood risk to third parties due to the Proposed Development, will be managed over the lifetime of the Proposed Development, /taking climate change into account.

1.2 Structure of this Report

1.2.1 The report is structured as follows:

- Section 2 - Site Description;
- Section 3 - Development Proposals;
- Section 4 - Planning Context;

[1] https://www.gov.uk/guidance/flood-risk-and-coastal-change

- Section 5 - Flood Risk Appraisal: this provides an initial assessment and a summary of the various sources of flood risk to the proposed development site;
- Section 6 - Drainage Strategy (DS): this section details the surface water drainage strategy and provides details of any mitigation required to limit surface water run-off;
- Section 7 - Flood Risk Management and Mitigation: this section details the measures to be taken to manage and mitigate flood risk; and
- Section 8 - Conclusions.

1.2.2 Supporting documents are presented at the end of the report in the form of an Outline DS within **Appendix A**. This includes:

- The drainage strategy;
- Site plans;
- A topographic survey;
- Evidence of the consultation process;
- Utility asset location plans;
- Calculation of greenfield runoff rates; and
- A conceptual drainage layout.

1.3 Sources of Data and Information

1.3.1 This FRA has made use of the following information sources:

- Draft revised Airports NPS (October 2017);
- NPPF (2012);
- Planning Practice Guidance: Flood Risk and Coastal Change (2014);
- PPG – Flood risk and Climate Change (2014);
- EA website www.environment-agency.gov.uk; 'What's in your backyard' (2018;)
- CIRIA, C753. The SUDS Manual, (2015);
- Kent County Council (KCC) Preliminary Flood Risk Assessment (2011);
- KCC Surface Water Management Plan Thanet Stage 1 Surface Water Management Plan (2012);
- KCC Local Flood Risk Management Strategy (2013);
- Thanet District Council (TDC) Strategic Flood Risk Assessment (2009); and
- TDC (2017), Thanet District Council Local Plan Core Strategy[2].

[2] [Accessed online on 09/11/2017 at https://www.thanet.gov.uk/your-services/planningpolicy/ thanets-new-local-plan/what-is-the-new-local-plan/]

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2. Site Description

2.1 The Site

2.1.1 The existing site consists of Manston Airport and an area to the north of the B2050 Manston Road and includes:

- A 2748m east-west aligned runway;
- A taxiway network;
- Aircraft stands (aprons);
- A terminal building;
- Cargo facilities; and
- An air traffic control tower (ATC).

2.1.2 The site includes an additional area to the north of the B2050 Manston Road which is known as the 'Northern Grass' area. This area was not previously part of the airport. It also includes the Jentex site to the south-east. This is currently a fuel storage depot, which would be developed as the airport fuel farm.

2.1.3 The Proposed Development site area is approximately 303ha.

2.2 Topography

2.2.1 The Isle of Thanet comprises an area of approximately 70km^2 extending 12km east-west by 4.5km north-south in the west and 9km north-south in the east. It is bordered by the English Channel to the north, east and south and by the River Stour and the River Wantsum to the west.

2.2.2 Its landform consists of a plateau that slopes gently westwards from the 30m high cliffs at the coast to an elevation of 10m above Ordnance Datum (AOD) in the west at the edge of the River Stour valley. The highest area is located around the airfield site where elevations reach 55mAOD. To the west and south, the flat expanse of the River Stour valley has an elevation of only 2mAOD and, in some areas, is below sea level.

2.2.3 The site is mainly situated at an elevation of between 45m to 50mAOD. The southern portion is located at an elevation of approximately 50 mAOD, along the length of the runway, but rises to approximately 55mAOD in the westernmost corner of the site. North of the runway the site declines to approximately 40mAOD in the west, at the crossroads of the B2050 Manston Road and the B2190 Spitfire Way, forming the start of the headwater valley for the Brooksend Stream, while remaining at 45m to 50mAOD in the northern most part of the site.

2.3 Hydrology, Drainage, Geology, Hydrogeology and Soils

2.3.1 The average annual rainfall recorded at Manston between 1981 and 2010 is 592.5 mm[3].

2.3.2 There are no perennial watercourses on the Isle of Thanet as the area is underlain by permeable chalk rock which permits infiltration of all rainfall.

2.3.3 There are no watercourses on or adjacent to the site. A series of water channels and streams that form part of the Minster Marshes lie more than 1km to the south of the site. This marsh drains south into the River Stour, 3km south of the site, which flows east and into

[3] Source: Met Office

Sandwich and Pegwell Bays. Ordnance Survey (OS) mapping shows a drainage channel on the opposite side of the road to the northern most point of the site. This is possibly associated with a plant nursery (Rosemary Nurseries) adjacent to the site.

2.3.4 OS mapping indicates a number of reservoirs within 3km of the site. A number of small uncovered reservoirs are approximately 1.5km or more from the western most boundary of the site. A covered reservoir is approximately 0.5km north of the site, and a further uncovered reservoir lies 0.3km from the southern site boundary.

2.3.5 There are a number of other small water features (e.g. ponds) within 3km of the site.

2.3.6 There are no public surface water sewers within the site. The closest Southern Water (SW) sewer is a combined sewer in the village of Manston immediately north of the main site.

2.3.7 The site is currently served by a private surface water network that drains to a pumping station immediately south of the B2050 Manston Road. This conveys surface water runoff towards a chamber in the west of the site, next to the existing runaway. From the chamber, all surface water runoff collected from the site flows via gravity in a pipeline towards an outfall into Pegwell Bay, 2km south-east of the site boundary.

2.3.8 A CCTV survey of the outfall pipeline was undertaken by RPS in April 2017. This found, that apart from debris in some sections, the overall condition of the outfall pipeline is good. The headwall of the outfall is at Pegwell Bay. A screen consisting of flat bars at approximately 100mm spacing is attached at the end of the headwall. A channel approximately 14m long flows directly from the headwall to the sea. At the time of a site walkover in 2017 the channel was partially buried by sand.

2.3.9 The Isle of Thanet is underlain by the middle sequence of the Upper Chalk Formation (White Chalk sub-group). The outcrop chalk units are the upper Newhaven Chalk, the Seaford Chalk and the Lewes Nodular Chalk. The chalk is more than 200m thick in the area of the site. The chalk is underlain by Gault Clay.

2.3.10 The chalk is either at outcrop or is overlain by the sands and silts of the Thanet Formation and Head deposits (composed mainly of interglacial wind-blown silts). The Thanet Formation is potentially present in the north-east of the site. Made Ground deposits are also anticipated to be present in many areas of the site.

2.3.11 The main aquifer under the Isle of Thanet is the chalk of which approximately the upper 70m is productive and supplies the majority of the public abstraction sources (classified as a Principal Aquifer). The public water supply wells on the Isle of Thanet are connected to adits. The adits are generally at levels at around 2 to -4 mAOD, (40-50mbelow ground level (bgl)), which is likely to be the zone of maximum productivity.

2.3.12 The Thanet Formation is classified by the EA as a Secondary Aquifer but, if present at the site, is likely to be unsaturated. The base of the chalk aquifer is the low permeability Gault Clay Formation which is classified as non-productive strata.

2.3.13 Recharge is predominantly via rainfall at the chalk outcrop where soils are light and permeable. Recharge is thought to be uniform across the exposed chalk irrespective of soil type. Recharge also occurs via the semi-permeable Thanet Formation. In urban areas rainfall recharge will be reduced but there will be additional recharge inputs from leaking sewers and water mains.

2.3.14 Given the permeable nature of soils and the chalk, runoff is not expected to occur and all rainfall to soil is anticipated to infiltrate. The site topography means that there are no up-slope areas with the potential to generate run-off that would flow on to the site.

2.3.15 The site is located entirely within a groundwater Source Protection Zone (SPZ) catchment of the Lord of the Manor public water supply abstraction operated by SW. The inner zone (SPZ1) forms a strip beneath the runway, and is coincident with the line of the western adit feeding the Lord of The Manor source. This is surrounded by a wider outer zone (SPZ2) that

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also dominates the area beneath the runway, in the south of the site. The remainder of the site falls within the wider SPZ catchment area (SPZ3).

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3. Development Proposals

3.1 Overview

3.1.1 The aim of the Proposed Development is to revive Manston Airport as an airfreight hub of national significance, with complementary passenger and engineering services. The proposed layout general arrangement overall plan is shown in **Appendix A.**

3.1.2 The existing 2,748m east-west aligned runway will be retained and upgraded. An assessment of the runway condition will be undertaken but it is likely that it will require rehabilitating to improve the load bearing capacity. The likely rehabilitation method will be an overlay using bituminous materials.

3.1.3 The existing taxiway network will need modifications to comply with European Aviation Safety Agency (EASA) guidelines. These include a new taxiway parallel to the runway, new taxiways linking aprons and stands and modifications to existing taxiways to ensure the gradient is compliant with EASA guidelines.

3.1.4 The passenger apron to the west of the terminal building will be retained. Two new areas of apron will be constructed between the runway and B2050 Manston Road. These will cover approximately 208,000m^2 to provide parking for up to 19 Code E aircraft. These facilities will be able to accommodate the larger types of aircraft, classified as Codes E, which many air freight operators currently use. The apron areas will incorporate 'slot drains' to collect surface water runoff.

3.1.5 Cargo facilities in the north-east of the site will be relocated; new airside cargo facilities and car park and storage areas will be constructed immediately to the north of the new cargo aprons with direct access to a new aircraft apron area. The new cargo facilities will cover approximately 65,000m^2. New storage and parking areas will cover approximately 129,000 m^2 (**Appendix A**). Due to the topography and the requirement for revised taxiway and apron gradients this area will require regrading to provide a building platform (Appendix A).

3.1.6 Facilities for secondary supporting aviation uses, including aircraft maintenance, repair and overhaul (MRO) and limited passenger services will also be provided (**Appendix A**). Passenger facilities with a new terminal and passenger apron, with sufficient space for up to four aircraft stands if required. The existing MRO facility will be replaced with a new facility capable of accommodating two of the larger types of aircraft.

3.1.7 A new fuel farm facility, incorporating best practice in the design and management of fuel storage such as above ground and bunded fuel tanks, will be constructed (**Appendix A**). For ease of access the facility will be located airside within the new areas of development.

3.1.8 Additional utility services will be required; these are likely to include internal electricity sub-stations, communication networks, and foul and surface water connections.

3.1.9 The surface water drainage network will include interception, attenuation and pollution control facilities designed in accordance with industry good practice and agreed with key stakeholders. Where appropriate, Sustainable Drainage Systems (SUDS) approaches will be used. Discharge will be to the existing permitted outfall to Pegwell Bay. An outline drainage layout is shown in **Appendix A.**

3.1.10 A new airport access for the cargo/aircraft maintenance facility is proposed on the B2190 Spitfire Way to the west of the existing access (**Appendix A**). This will link in with proposals for highways improvements by KCC Highways Department. RiverOak will work with them to provide improved access in and around the airport, for example to deliver improvements to the junction of Manston Road and Spitfire Way. A landscaping zone between the new

internal access road and the public highway will be provided to screen the Proposed Development.

3.1.11 The two museums on the site, the Royal Air Force (RAF) Manston Museum and the Spitfire and Hurricane Memorial Museum, will ~~be relocated to a new museum area~~remain on site, with an area of land being safeguarded. Indicative proposals for a new Spitfire and Hurricane memorial building have been prepared, which include the creation of a café and seating area ~~The old ATC building, located to the east of the Spitfire and Hurricane Memorial Museum, will be converted to provide a new café and observation area~~ (**Appendix A**).

3.1.12 The 'Northern Grass' area, north of the B2050 Manston Road, will be used for other airport-related business development such as warehousing, offices and airport related business units, but will have no direct access for aircraft (**Appendix A**). The requirements for facilities airside mean that there will be limited space within the main site for expansion of aviation-related businesses and activities that can be located landside will be located here. Initial proposals for this area indicated that it could support multiple business units of various sizes and layouts with an approximate total floor spaces of 105,100m^2. The DCO application will include proposals based on outline design parameters. A safeguarding zone around the airport radar installation will be retained. The size of this area will be dependent on the type and specifications of the radar.

3.2 Airport Construction Phase

3.2.1 The initial phase of construction, which will commence following the grant of the DCO (assumed to be Q2 2019), will focus on returning the airport to operation and reusing as much of the remaining original airport infrastructure as possible. The airport has not been operational since May 2014 and is unlikely to have been subject to regular maintenance since that date. The main activity to be undertaken during Year 1 will be construction works required to return the existing airport to full operational use (construction phase 1). Subsequently, the full reopening of the airport would occur in Year 2, currently expected to be Q4 2020, which would also see the start of the air freight services. Passenger services are anticipated to commence in Year 4, currently 2022.

3.2.2 The remaining phases of the Proposed Development will be undertaken in accordance with the emerging and developing business case for the airport. An outline phased development is likely to comprise the following stages:

- Relocate existing facilities located within new development area;
- Install new airside infrastructure (relocate taxiway alpha, new fuel farm);
- Provide new site location access;
- Upgrade site services (electricity, surface water drainage and treatment);
- Improve community facilities (museums and café/observation centre);
- Development, in phases, of new aircraft stands, aprons and cargo facilities as required; and
- Development of 'Northern Grass' area for aviation related businesses.

3.3 Airport Operational Phase

3.3.1 The air freight operations, which will be the main focus for the airport, are expected to start shortly after construction phase 1. From this initial base, the airport would seek to attract additional customers and clients including offering the facilities as the base for one or more freight forwarding and handling companies.

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3.3.2 The future impermeable area has been calculated based on the Masterplan in **Appendix A**. The site has been divided into three drainage catchments, based on the existing drainage patterns and future development proposals. These consist of the main airport site, the 'Northern Grass' area and the fuel farm. **Table 3.1** summarises the proposed changes to permeable/impermeable land uses across the Proposed Development site. As a result, peak rates and volumes of storm run-off will increase. Additional storage will be required to manage and attenuate flows and to permit treatment of potentially contaminated run-off. The rate at which water will leave the site will be governed by the size of pumps used to transfer water to the outfall and is likely to be the same (if existing pumps continue to be used) or higher (new pumps) than the existing discharge.

Table 3.1 Existing/Proposed Impermeable/ Permeable Split

Drainage Catchment Area (Hectares, Ha)	**Permeable**		**Impermeable**	
	Existing	Proposed	Existing	Proposed
Whole site	204	134	99	169

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4. Planning Context

4.1 National Planning Policy

4.1.1 The NPS requires that the applicant, the Examining Authority and the Secretary of State in taking decisions should take account of the policy on climate change adaptation as set out in the NPPF and other supporting guidance when considering flood risk.

4.1.2 The NPPF sets out that inappropriate development in areas at risk of flooding should be avoided. In addition, it also advocates that new development should be planned to avoid increased vulnerability to the range of impacts arising from climate change. The extent of any impact will depend on the ability of the development to manage storage of water on or off-site.

4.1.3 The NPS indicates that airport expansion has the potential to result in increased risk from climate change effects, particularly to increased surface water runoff rate and pressure on potable water supply.

4.1.4 The NPS requires a FRA for projects that are:

- In Flood Zones 2 and 3; or
- In Flood Zone 1 where the project is 1ha or greater, which may be subject to other sources of flooding (local watercourses, surface water, groundwater or reservoirs), or where the EA has notified the local planning authority that there are critical drainage problems.

4.1.5 The NPS indicates that a FRA should:

- Consider the risk of all forms of flooding arising from the Proposed Development, in addition to the risk of flooding to the development itself and demonstrate how these risks will be managed and where relevant, mitigated, so that the development remains safe throughout its lifetime;
- Take into account the impacts of climate change, clearly stating the development lifetime over which the assessment has been made;
- Consider the need for safe access and exit arrangements;
- Include the assessment of residual risk after risk reduction measures have been taken into account, and demonstrate that this is acceptable for the development;
- Consider if there is a need to remain operational during a worst-case flood event over the preferred scheme's lifetime; and
- Provide evidence for the Secretary of State to apply the Sequential Test and Exception Test (see Section 4.4).

4.1.6 In addition, site layout and surface water drainage systems should be able to cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts.

4.1.7 The surface water drainage arrangements for any project should be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, taking into account climate change, unless specific off-site arrangements are made and result in the same net effect.

4.1.8 The sequential approach should be applied to the layout and design of the project. Vulnerable uses should be located on parts of the site at lower probability and residual risk of flooding. Developers should seek opportunities where appropriate to use open space for

multiple purposes such as amenity, wildlife habitat, and flood storage uses. Opportunities should also be taken to lower flood risk by improving flow routes, flood storage capacity and using sustainable drainage systems.

4.2 Local Planning Policy

4.2.1 TDC has produced a Strategic Flood Risk Assessment (SFRA) (TDC, 2009). This identified tidal flooding near the coast and fluvial flooding along the River Stour as having the greatest flood risk in the area. Groundwater flooding was not identified to be of strategic concern. The SRFA did not address flood risks associated with drainage networks.

4.2.2 The SRFA indicates that flood risk should be managed by:

- Avoiding high risk sites;
- Take into account climate change in FRAs;
- Adopt resilient measures for all development at risk of flooding; and
- Taking into account wind and wave action for coastal FRAs.

4.3 Other Relevant Plans, Policies and Strategies

4.3.1 KCC is the lead local flood authority (LLFA) for Kent. KCC published their Preliminary Flood Risk Assessment (PFRA) in September 2011 (KCC, 2011). This used surface water mapping data provided by the EA to assess the risks in Kent and where further investigations should be prioritised.

4.3.2 Subsequently, KCC developed a Local Flood Risk Management Strategy (LFRMS, KCC, 2013), which has five objectives, as follows:

1. Improving the understanding of the risks of flooding from surface runoff, groundwater and ordinary watercourses in Kent.
2. Reducing the risk of flooding on people and businesses in Kent
3. Ensuring that development in Kent takes account of flood risk issues and plans to effectively manage any impacts.
4. Providing clear information and guidance on the role of the public sector, private sector and individuals in flood risk management in Kent and how those roles will be delivered and how authorities will work together to manage flood risk.
5. Ensuring that emergency plans and responses to flood incidents in Kent are effective and that communities understand the risks and their role in an emergency.

4.3.3 These objectives have been developed to be consistent with the National Flood and Coastal Erosion Risk Management strategy produced by the EA and KCC's Vision for Kent 2012 to 2022, and to address the needs of local flood risk in Kent. Objective 3 is particularly relevant to the Proposed Development at Manston.

4.3.4 The LFRMS also indicates that new development should manage runoff in a sustainable manner, where possible using natural processes. Local plans and strategies should adopt policies that encourage new developments to use these techniques. Some planning authorities in Kent have developed specific policies and local guidance to encourage the use of SUDS, TDC's Policy CC02 quoted above being once such example. Such policies have proven to be very effective as it provides a clear picture to potential developers of what is required for all developments.

4.3.5 The provisions of the *Floods and Water Management Act 2010* that would place SUDS approval, adoption and maintenance responsibilities on LLFAs like KCC have yet to be

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implemented. KCC will issue guidance for other risk management authorities, developers and other interested parties on how it will undertake the role of drainage approving body and how to apply for drainage approval once Defra has published details of how this role will be undertaken. In the meantime, KCC will provide advice to any prospective developer about how to implement sustainable drainage.

4.3.6 KCC has developed a series of local SWMP plans. Manston falls entirely within the SWMP for Thanet (KCC, 2012) and lies largely within the Thanet Rural drainage area.

4.4 Sequential Test and Exception Test

Sequential test

4.4.1 The NPPF describes the principles of the Sequential Test, which aims to steer new development to areas with the lowest probability of flooding. The Sequential Test is a decision-making tool designed to ensure that sites at little or no risk of flooding are developed in preference to areas at higher risk. As the whole site is located within Flood Zone 1 and all of the Proposed Development will be located within this flood zone, the Sequential Test is considered to have been passed. All new development associated with the Proposed Development will be in Flood Zone 1.

Exception test

4.4.2 The Exception Test requires that if, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. As the whole site is in Flood Zone 1, the Exception Test does not apply.

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5. Flood Risk Appraisal

5.1 Introduction

5.1.1 This FRA considers the flood risks associated with the construction and operational phases of the Proposed Development. Both flood risks to and flood risks from the development are considered in this FRA. The FRA covers the 'Order Limits' which is the anticipated maximum extent of land in which the Proposed Development, including construction works, would take place. The entire Order limits are shown in **Figure 2.1**. This FRA uses a source-pathway-receptor led approach to the assessment of flood risk.

5.2 Summary of Potential Sources

5.2.1 The EA's flood map is shown on **Figure 5.1**. It can be seen that the site lies entirely in Flood Zone 1, and is therefore considered to be negligible risk of flooding from fluvial or tidal sources. **Table 2.2** summarises the flood risk across the site from various potential sources of flooding - these are then discussed in the following sections.

Table 5.1 Summary of Potential Flood Risk Sources

Source of Flooding	Risk Posed	Notes
Fluvial	None	The whole site is located in Flood Zone 1 on the EA flood map. No watercourses are located within or adjacent to the site.
Tidal	None	There is no risk of tidal flooding to the site due to the distance to the coast and the elevation difference between the site and sea.
Groundwater	Negligible	The elevation of the site and the great depth to the water table indicates that there is a very low risk of groundwater flooding.
Surface run-off/ run-on and surface water drainage	Low	With the exception of the B5020 Manston Road to the north of the Proposed Development, the site is largely self-contained with very limited off-site upslope catchment. The site is located in an area of permeable soils which will typically not generate surface water runoff. However, EA flood maps for surface water, which are based on modelled of surface water flood risk indicates a potential risk of surface water flooding as a result of runoff from impermeable areas within the site. The proposed area of impermeable surfaces on site will increase as a result of the Proposed Development. The site will have a modern, purpose-designed drainage system to manage flows leaving the site. Surface water drainage will be to the sea at Pegwell Bay and will not, therefore, affect downstream land. A DS is presented in **Appendix A**, which sets out how run-off will be managed and attenuated so as not to increase downstream flood risk
Sewer	Low	No public surface water sewers are present on site. There are no records of sewer flooding at the site
Artificial / reservoirs	No risk	There are no artificial water bodies or flood defences that pose a risk of flooding to the site.

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5.3 Fluvial and Tidal Flooding

5.3.1 The EA's flood map (**Figure 5.1**) shows the site is in Flood Zone 1. The site is situated on a hill at an elevation of 50mAOD, with the lowest edges of the site at approximately 40mAOD. All known watercourses are below the level of the site. Furthermore, the site is elevated considerably above the maximum conceivable tidal flood level. The site is not therefore considered to be at risk of fluvial or tidal flooding.

5.4 Groundwater Flooding

5.4.1 The Thanet SFRA (TDC, 2009) states that the District of Thanet is generally not an area with a high risk of groundwater flooding, despite the underlying chalk geology. This is because ground elevations are generally high and the water table is at depth. This is particularly the case for the Proposed Development site, as it is located at the highest point in the district.

5.5 Surface Water Flooding

5.5.1 The Thanet SFRA provides an assessment of surface water flood risk across the Thanet district. The SFRA contains mapping of areas potentially at risk (current in 2009).

5.5.2 The risk of surface water flooding is also shown on EA maps[4]. An extract of mapping of flood risk from all sources for the area covering the site is shown on **Figure 5.2**. This indicates a risk of surface water flooding by water generated within the site and along Manston Road based on the results of surface water modelling.

5.5.3 As the site is on a local topographical high point it has no upslope areas, so is effectively only at risk of water generated from within the site boundaries. The key issue is therefore the flood risk from surface water originating within the site, which will be managed via the site drainage.

5.5.4 The risk of flooding within the site must also be manged to ensure safe access and egress and to prevent interruption of operations. The DS has been designed to manage surface water within the site to prevent flooding and maintain safe access and egress.

[4] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

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5.6 Sewer Flooding

5.6.1 The local SWMP (KCC, 2013) collated records of sewer flooding on the Isle of Thanet. None of the 25 incidents identified were within the site boundary or close to (within 2km) to the site.

5.7 Existing Flood Defence Structures

5.7.1 No existing flood defence structures have been identified within close proximity of the site.

5.8 Historical Flooding

5.8.1 Records of historical flooding in the area are documented in the KCC SWMP Appendix C. Two of these incidents took place in the vicinity of Manston Airport: one at Manston Court Road in 2008 adjacent to the eastern boundary of the Northern Grass and extending along Manston Road to the west (carriageway flooding due to heavy rain no property flooding); and the other on Hengist Way on the southern boundary of the site (no details or a date is available).

5.8.2 Many of the historical incidents reported in the LFRMS (KCC, 2013) relate to:

- Blocked drains and / or surcharging of drains during and following heavy rain;
- Flooding of land adjacent to roads; and
- Coastal flooding due to tidal surges.

631000
632000
633000
634000
635000
167000
166000
165000
164000
ACOL CP
Acol
Manston
THANET DISTRICT
Minster
MINSTER CP
Isle of Thanet
Cliffs End

RSP

amec foster wheeler

Figure 5.1
Excerpt from flood map for planning for site location

February 2018

631000
632000
633000
634000
635000
167000
166000
165000
164000
ACOL CP
Acol
THANET DISTRICT
Manston
Minster
MINSTER CP
Cliffs End
Isle of Thanet

Chance of flooding in any year

RSP

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Figure 5.2
Risk of flooding from multiple sources

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6. Development of the Drainage Strategy

6.1 The Drainage Strategy

6.1.1 An outline DS for the site has been developed and is provided as **Appendix A**.

6.2 Planning Policy

6.2.1 National planning guidance, in the form of the Airports NPS, NPPF and PPG on flood risk and climate change, requires that surface water discharge from a development site should be such that the volumes and peak flow rates are no greater than the rates prior to the proposed development, including allowance of the effects of climate change on extreme rainfall intensities over the proposed development lifetime, unless specific off-site arrangements are made and result in the same net effect. It also suggests that, where possible, rainfall should be retained on site and allowed to infiltrate within the site. This usually means that run-off volumes will have to be stored during a storm and released slowly to meet the discharge rate requirement. However, in this case of a discharge to the coast, this restriction is unlikely to be applicable.

6.2.2 The NPS and NPPF further advise that planning authorities should promote the use of SUDS in the management of surface water run-off from new developments. Thus, there is a presumption for the use of SUDS in development, unless it can be demonstrated that systems of this type are not feasible.

6.3 Floods and Water Management Act, 2010

6.3.1 Under the *Floods and Water Management Act 2010*, KCC are the LLFA and a statutory consultee on drainage matters for planning applications. At detailed design stage, the drainage design will need to be submitted to KCC for approval.

6.3.2 The *Floods and Water Management Act 2010* also recognises the roles played by district councils, internal drainage boards, highways authorities and water companies and these bodies, together with the EA, are identified as risk management authorities.

6.4 Consultation on the Drainage Strategy

6.4.1 The outline DS and FRA were developed following consultation with KCC and the EA. Evidence of the consultation process is provided in **Appendix A**.

6.4.2 The key factors from the consultation process that have influenced the outline drainage strategy and assessment of flood risk are:

- Delineation of separate catchments for the ‘Northern Grass’ area, main site and fuel farm;
- Avoidance of infiltration of water potentially containing pollutants to protect groundwater quality through the use of sealed drains in areas where pollutants are potentially present and subsequent discharge to the sea;
- Incorporation of permeable paving in the ‘Northern Grass’ area; and
- Consideration of appropriate climate change factors.

6.5 Climate Change

6.5.1 Climate change is currently predicted[5] to increase the wetness of winters and the dryness of summers. The intensity of storm events is anticipated to increase over time to 5% by 2025, 10% by 2055, 20% by 2085 and 30% by 2115. The increased intensity will have an impact on the volume of rainfall that will fall at the site.

6.5.2 To account for climate change the DS incorporates a climate change allowance increase of 40% in the design calculations.

6.6 SUDS Selection Criteria

6.6.1 The aim of SUDS is to ensure that surface water run-off is managed as close to its source as possible unless there are practical reasons for not doing so. The hierarchy of SUDS drainage options is set out in the NPPF PPG, and the aim should be to discharge surface runoff as high up this hierarchy as reasonably practicable:

1. Into the ground (infiltration);
2. To a surface water body;
3. To a surface water sewer, highway drain, or another drainage system; and
4. To a combined sewer.

6.6.2 However, the Thanet FRA (2009) recognises that infiltration may not be compatible with groundwater protection in areas of high groundwater vulnerability and where the discharge has the potential to contain pollutants. Where infiltration is not possible, the SFRA states that preference should be given to discharge surface water into watercourses rather than into foul water drains. KCC also note in their SWMP for Thanet (KCC, 2012) that "*To ensure protection from further deterioration of groundwater quality, there are likely to be restrictions on any proposed SUDs devices involving infiltration. The acceptability and construction details of infiltration devices is not only based on whether a site is in an SPZ but also depends on if the ground conditions are suitable (i.e. free from contamination) and if there is adequate unsaturated zone to offer attenuation of the discharge*".

6.7 Requirements of the Drainage System

6.7.1 The existing drainage arrangements at the site divert rainfall runoff falling on hard standing within the site to a sea outfall to Pegwell Bay. This outfall is of sufficient size to accept peak flows without surcharging. It is proposed to continue to use this arrangement.

6.7.2 The site lies within a source protection zone for a public water supply well. The public water supply is vulnerable to pollution from activities at the site because the geology is permeable at the surface. Both the EA and Southern Water wish to avoid infiltration to ground of potentially polluting substances and, therefore do not support the use of infiltration of surface drainage collected on hardstanding (runways, taxiways, aprons etc.).

6.7.3 The outfall to Pegwell Bay consists of a large diameter pipe, which has a significant fall. This is unlikely to constrain the discharge flow rate. The main constraints on the rate at which water will be discharged are:

- The rate at which potentially contaminated water can be treated;
- The size of the pump that transfers water to the runway drain; and
- The capacity of the runway drain.

[5] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowance

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In addition, flows will be managed to avoid scour at the point of discharge to Pegwell Bay.

6.7.4 The outline drainage design is based on a peak pumping flow rate of up to 100l/s. Using this value, attenuation ponds have been sized to provide sufficient storage to accommodate flood water up to a 1% AEP (or 1 in 100 year) plus 40% climate change effect rainfall event. In addition, the piped drainage system provided as part of the development will need to be designed to cope with the 100% AEP event (1 in 1 year storm event) without surcharging and to not result in on-site flooding up to a 3.33% AEP (1 in 30 years) plus 40% climate change event and to not result in any off-site flooding for rainfall events up to 1% AEP (1 in 100 year) plus 40% climate change event. The risk of surcharging has been assessed to establish if any overland flow routes could cause temporary surface water flooding. Where there is a risk that the system does surcharge in intense storm events, then site levels will be developed to contain flows within areas of impermeable cover and the drainage system. The Northern Grass and main sites will be connected by a pipe network.

6.7.5 The drainage strategy has taken into account the need to manage surface water at source and as the water is conveyed through the site as set out in The SUDS Manual (CIRIA, 2015). The drainage strategy assessment has been made by considering the SUDS hierarchy and choosing suitable techniques in line with the main objectives of Quantity (Flood Reduction), Quality (Pollution Reduction) and Amenity/Biodiversity (Landscape and Wildlife Benefit).

Compatibility of SUDS with site conditions

6.7.6 A SUDS hierarchy approach has been used in the drainage strategy, as follows:

- Infiltration has not been considered on the airport site due to the possible presence of pollutants in surface water and the vulnerable nature of the aquifer beneath the airport maybe acceptable for clean water (e.g. roof drainage) in areas away from the adit for Lord of the Manor public water supply. Typically, SUDS techniques that promote infiltration of surface water are preferred over those which promote attenuation before discharge to a watercourse. The underlying solid geology (chalk) typically has a high potential infiltration rate, making it suitable for infiltration. However, at Manston, much of the site lies within SPZ1 and SPZ2 where the use of infiltration that is potentially contaminated is discouraged by the EA. As a consequence, the draft drainage strategy has been developed to avoid infiltration over much of the site. The exception is surface water runoff generated from the roof of the proposed buildings and associated car park within the Northern Grass area, which will be collected and attenuated via SuDS features such as permeable pavement and porous carpark. These features will remove traffic-related pollutants from runoff and provide attenuation. Surface water runoff will then be discharged to ground via infiltration.
- Discharge to open watercourses. Due to the permeable nature of the chalk geology in the Isle of Thanet, there are no permanent watercourses between the development site and the coast, which is located approximately 2km south east of the site at its nearest point. As the existing surface water system within the site eventually discharges into Pegwell Bay, it is proposed that the drainage follows the existing system. As the discharge is to the sea, there is no flow restriction on discharge rates at the receptor. Nevertheless, the peak discharge rate from the development will be restricted to 100l/s, as set out above. Attenuation is proposed for the development in order to (1) allow for treatment of potentially polluted water; and (2) to store rainfall in excess of pump capacity prior to it being pumped to the Pegwell Bay outfall.
- Discharge rainwater to a surface water sewer/drain. There are no surface water sewers within the vicinity of the site, so this option is ruled out.
- Discharge rainwater to the combined sewer. Given the nature of the development it is highly likely that the existing combined sewer network that serves Manston village will not have sufficient capacity, so this option is ruled out.

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6.8 The Proposed SUDS Solution

6.8.1 The site has been divided into three drainage catchments: Northern Grass (49ha), the main site (252ha) and the fuel farm (2.0ha) respectively (303ha in total). Across the site there will be a total drained area of 169ha; the remaining 134ha of the site will remain as greenfield where rainwater will infiltrate to ground.

6.8.2 All surface water falling on impermeable surfaces will be collected. Infiltration of potentially contaminated surface water will not be allowed, to avoid pollution of groundwater, as agreed with the EA, Southern Water and accepted by KCC.

- Surface water from the roadways in the Northern Grass and main site will be collected in a drainage network and directed to SUDS treatment and attenuation ponds in the north of the site;
- In the Northern Grass area catchment, permeable paving underlain by an impermeable membrane will be used beneath roads and footways to provide attenuation of drainage. However, surface water runoff generated from the roof of buildings and associated car parks will be collected and attenuated via SUDS features such as permeable pavement and porous carpark. These will remove traffic-related pollutants and provide attenuation. Surface water will then be discharged into ground via infiltration;
- Potentially contaminated water from the runway, taxiways and aprons will be treated at the ponds;
- There will be two ponds, one to accept potentially contaminated water for storage and treatment and one that accepts clean water e.g. from roof drainage;
- The discharge from the treatment pond will be to the clean pond;
- From the ponds, surface water will be pumped to the western end of the runway from where it will gravity drain within a pipe along the edge of the runway (eastwards) before entering an outfall that directs water to Pegwell Bay;
- The fuel farm will have a separate drainage system that directs water through oil-water separators before discharge to the Pegwell Bay outfall. The fuel farm drainage will also incorporate an anti-pollution non-return control valve; and
- No surface water will be directed to the public sewer network.

Attenuation requirements

6.8.3 To manage the 1% AEP (1 in 100 year) plus 40% climate change event, surface water will be directed to attenuation ponds with an estimated combined capacity of approximately 160,000 m^3. These have been sized based on the assumptions detailed in **Appendix A**.

6.8.4 In the drainage strategy discharge rates have been limited to 100l/s. All attenuation storage calculations include a 40% allowance on rainfall to account for the effects of climate change over the lifetime of the Proposed Development, as agreed with KCC (see **Appendix A**).

6.8.5 In the Northern Grass area, treatment and additional attenuation storage will be provided by the use of permeable paving underlain by an impermeable barrier before drainage enters the attenuation ponds.

6.8.6 Calculations of run-off rates, proposed impermeable areas and attenuation requirements have been undertaken based on reasonable assumptions to determine the required size and layout of SUDS assets in support of the DCO. Detailed drainage and SUDS design will be carried out subsequent to the granting of planning consent, and will be approved either via discharge of a condition of the consent, or as part of a discharge permit application. Detailed drainage design will need to be completed in future and agreed with the KCC as the LLFA and the EA as the approving body for discharge permits.

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6.8.7 Flows will be managed to avoid scour at the point of discharge to Pegwell Bay.

Treatment

6.8.8 Surface water collected from runways, taxiways and apron areas may be contaminated with hydrocarbons from refuelling / leaks and with de-icer (ethlylene glycol). It will therefore be treated prior to discharge.

6.8.9 Treatment is likely to consist of aeration within the attenuation pond and an oil-water separator. The treatment option and final water quality will be determined as part of detailed design. The final water quality will take into account the sensitivity of the receiving water (Pegwell Bay).

6.8.10 Permeable paving underlain by an impermeable membrane in the Northern Grass area will provide some treatment of pollutants prior to discharge to the attenuation ponds.

6.8.11 Water collected in the fuel farm will pass through an oil-water separator to remove hydrocarbons before discharge to the Pegwell Bay outfall. An anti-pollution control valve will also be incorporated to allow the discharge to be sealed in the event of a pollution incident.

Outfall options

6.8.12 The proposed surface water outfalls from the attenuation ponds will consist of a pumped scheme to carry water into the sea outfall pipeline from where it will gravity drain to Pegwell Bay. The final layout of the ponds and details of the outlet flow control will need to be confirmed at detailed design stage.

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7. Conclusions

7.1.1 The following conclusions can be drawn:

- The site lies in Flood Zone 1, which means that it is at low risk of fluvial or coastal flooding;
- The site is also at low risk of flooding from other sources (groundwater, reservoirs);
- The Sequential Test has been passed and the Exception Test does not need to be applied in the case of this development as it is entirely located in Flood Zone 1;
- All potential risks of flooding to the site have been assessed and mitigation and management options have been presented and incorporated into the outline design strategy;
- The outline drainage strategy is to collect all water falling on impermeable surfaces, pass it through attenuation or treatment ponds and then direct it to the sea at Pegwell Bay; and
- Implementation of the drainage strategy will prevent surface water flooding within the site or flooding of neighbouring land, including allowance for the potential effects of climate change over the lifetime of the Proposed Development.

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References

CIRIA, 2015. The SUDS Manual, C753

Department for Transport. 2017. Revised Draft Airports National Planning Statement (NPS) (https://www.gov.uk/government/publications/revised-draft-airports-national-policy-statement)

Department for Communities and Local Government. 2012. National Planning Policy Framework.

Environment Agency, 2017. Flood risk assessments: climate change allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances)

Kent County Council, 2011. Preliminary Flood Risk Assessment

Kent County Council, 2013. Thanet Stage 1 Surface Water Management Plan

Kent County Council, 2013. Local flood risk management strategy

Ministry of Housing, Communities and Local Government, 2014. Planning Practice Guidance: Flood Risk and Coastal Change (https://www.gov.uk/guidance/flood-risk-and-coastal-change)

Thanet District Council, 2009. Strategic Flood Risk Assessment

Thanet District Council (2017), Thanet District Council Local Plan Core Strategy

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Appendix A
Drainage Strategy

MANSTON AIRPORT
RAMSGATE, CT12 5BQ

OUTLINE DRAINAGE STRATEGY

FOR

RIVEROAK STRATEGIC PARTNERS

March 2018

Our Ref: RCEF54574-004

RPS Health, Safety & Environment
Unit 12 Watersedge Business Park
Modwen Rd, Salford Quays
M5 3EZ

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Report Status:	FINAL	
Project Reference:	RCEF54574	
	Name:	**Signature:**
Report Author:	Ersum Shahid	[redacted]
Technical Reviewer:	Rizal Roney	[redacted]
Date:	March 2018	

This report has been prepared in the RPS Group Quality Management System to British Standard EN ISO 9001:2008

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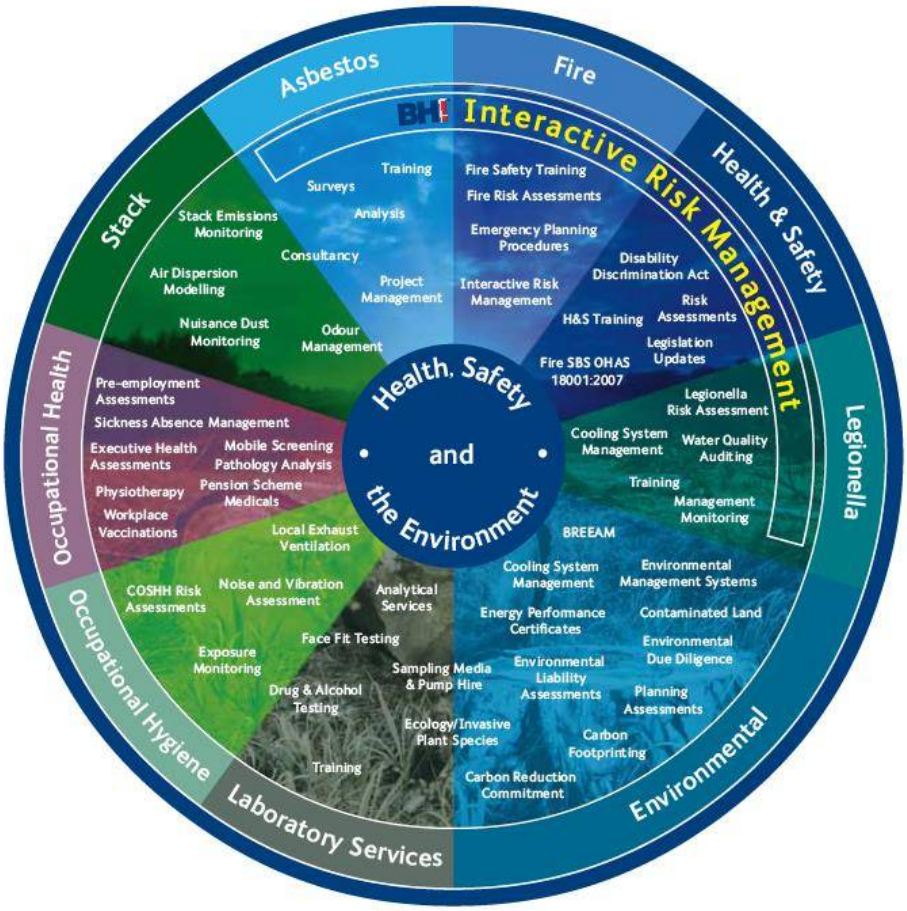

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RPS HEALTH, SAFETY & ENVIRONMENT

General Notes

1. The following notes should be read in conjunction with the report:

2. This report contains only that available factual data for the site, which was obtained from the sources, described in the text. These data were related to the site on the basis of the location information made available to RPS by the client.

3. The assessment of the site is based on information supplied by the client. Relevant information was also obtained from other sources.

4. The report reflects both the information provided to RPS in documents made available for review and the results of observations and consultations by RPS staff.

5. Where data have been supplied by the client or other sources, including that from previous site audits or investigations, it has been assumed that the information is correct but no warranty is given to that effect. While reasonable care and skill has been applied in review of this data no responsibility can be accepted by RPS for inaccuracies in the data supplied.

6. This report is prepared and written in the context of the proposals stated in the introduction to this report and its contents should not be used out of context. Furthermore new information, changed practices and changes in legislation may necessitate revised interpretation of the report after its original submission.

7. The copyright in the written materials shall remain the property of the RPS Company but with a royalty-free perpetual license to the client deemed to be granted on payment in full to the RPS Company by the client of the outstanding amounts.

CONTENTS

APPENDICES

1 INTRODUCTION

1.1 RPS was commissioned to undertake an Outline Drainage Strategy for the re-opening of of Manston Airport, Ramsgate, CT12 5BQ (the Proposed Development). The airport is currently disused. The Proposed Development is looking to reopen the airport for commercial and public service.

1.2 The aim of this strategy is to assess and consider the feasibility of a range of Sustainable Drainage Systems (SuDS) techniques for incorporation within the development. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG). Reference has also been made to the CIRIA SuDS Manual (C753), Kent County Council and Thanet District Council planning policies.

1.3 This report has been produced in consultation with Kent County Council (KCC) as the Lead Local Flood Authority (LLFA) and Thanet District Council as the Local Planning Authority (LPA).

1.4 This report is not intended to provide a detailed surface water drainage strategy for the Proposed Development. It provides information regarding the capabilities of the proposed drainage to meet the requirements of the LLFA, LPA and the NPPF.

1.5 The desk study was undertaken by reference to information provided or published by the following bodies:

- KCC;
- Thanet District Council (TDC)
- British Geological Survey (BGS);
- Ordnance Survey (OS); and
- Southern Water (SW).

2 PLANNING POLICY CONTEXT

National Planning Policy[1]

2.1 In a written statement to Parliament on 18th December 2014, the Secretary of State for Communities and Local Government strengthened existing planning policy on sustainable drainage, making it clear that sustainable drainage systems should be provided in new developments, unless demonstrated to be inappropriate. The statement requires that:

'in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. The sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate.'

2.2 These changes took effect from 6th April 2015. This policy applies to all developments of 10 homes or more and to major commercial development.

2.3 Defra published their 'Non-statutory technical standards for sustainable drainage systems'[2] in support of the above policy changes, in March 2015.

Regional Planning Policy

2.4 In June 2017, KCC published the 'Drainage and Planning Policy Statement'[3]. The document intends to provide local flood risk management strategy guidance for developments within the wider Kent county area.

2.5 As part of the document KCC summarizes Kent's requirement for Sustainable Drainage through the following policies:

SuDS Policy 1: Follow the Drainage Hierarchy

"Surface runoff not collected for use must be discharged according to the following discharge hierarchy:

- *to ground,*

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1 **Department for Communities and Local Government (2017), National Planning Policy Framework** [Accessed online on 09/11/2017 at http://planningguidance.communities.gov.uk/blog/policy/]

2 **Department for Environment, Food and Rural Affairs, (2017), Non-statutory technical standards for sustainable drainage systems** [Accessed online on 09/11/2017 at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf]

3 **Kent County Council, Drainage and Planning Policy Statement, (2017), Kent County Council** [Accessed online on 09/11/2017 at https://www.kent.gov.uk/__data/assets/pdf_file/0003/49665/Drainage-and-Planning-policy-statement.pdf]

- *to a surface water body,*
- *a surface water sewer, highway drain, or another drainage system, or*
- *to a combined sewer where there are absolutely no other options,*
- *and only where agreed in advance with the relevant sewage undertaker.*

The selection of a discharge point should be clearly demonstrated and evidenced."

SuDS Policy 2: Manage Flood Risk Through Design

"It is essential that the drainage scheme proposed:

- *protects people and property on the development site from flooding and;*
- *does not create any additional flood risk outside of the development in any part of the catchment, either upstream or downstream.*

Any drainage scheme must manage all sources of surface water, including exceedance flows and surface flows from offsite, provide for emergency ingress and egress and ensure adequate connectivity."

SuDS Policy 3: Mimic Natural Flows and Drainage Flow Paths

"Drainage schemes should be designed to match greenfield discharge rates, volumes and follow natural drainage routes as far as possible."

SuDS Policy 4: Seek to Reduce Existing Flood Risk

"New development should be designed to take full account of any existing flood risk, irrespective of the source of flooding.

Where a site or its immediate surroundings have been identified to be at flood risk, all opportunities to reduce the identified risk should be investigated at the masterplanning stage of design and subsequently incorporated at the detailed design stage.

For brownfield sites, and unless demonstrated to be reasonably impracticable, we would expect a 50% reduction in the peak runoff rate."

SuDS Policy 5: Drainage Sustainability and Resilience

"The proposed drainage system must consider life-time sustainability of the drainage measures and components.

The design of the drainage system must account for the likely impacts of climate change and changes in impermeable area over the design life of the development. Appropriate allowances should be applied in each case.

A sustainable drainage approach which considers control of surface runoff at the surface and at source is preferred and should be considered prior to other design solutions."

SuDS Policy 6: Design to be Maintainable

"A drainage scheme maintenance plan should be prepared which demonstrates a schedule of activities, access points, outfalls and any biodiversity considerations.

The maintenance plan should also include an indication of the adopting or maintaining authority or organisation and may require inclusion within a register of drainage features."

Local Planning Policy

2.6 The Thanet Local Plan 2006 Saved Policies (LP)[4] was adopted by the city council in June 2006. The Local Plan contains the following policies relating to the development and drainage requirements:

"POLICY D1 - DESIGN PRINCIPLES

1. *ALL NEW DEVELOPMENT IS REQUIRED TO PROVIDE HIGH QUALITY AND INCLUSIVE DESIGN, SUSTAINABILITY, LAYOUT AND MATERIALS.*

2. *A NEW DEVELOPMENT PROPOSAL WILL ONLY BE PERMITTED IF IT:*

A. *RESPECTS OR ENHANCES THE CHARACTER OR APPEARANCE OF THE SURROUNDING AREA, PARTICULARLY IN SCALE, MASSING, RHYTHM, AND USE OF MATERIALS APPROPRIATE TO THE LOCALITY;*

B. *IS COMPATIBLE WITH NEIGHBOURING BUILDINGS AND SPACES AND DOES NOT LEAD TO UNACCEPTABLE LOSS OF AMENITY THROUGH OVERLOOKING, NOISE OR VIBRATION, LIGHT POLLUTION, OVERSHADOWING, LOSS OF NATURAL LIGHT, OR SENSE OF ENCLOSURE;*

C. *INCORPORATES WHERE PRACTICABLE A HIGH DEGREE OF PERMEABILITY FOR PEDESTRIANS AND CYCLISTS AND ALSO CONSIDERS ACCESS FOR PUBLIC TRANSPORT;*

D. *INCORPORATES PROVISION FOR DISABLED ACCESS;*

E. *RETAINS OPEN SPACES, GAPS IN DEVELOPMENT, MATURE TREES, OTHER VEGETATION AND ANY OTHER FEATURES THAT CONTRIBUTE TO BIODIVERSITY AND THE QUALITY OF THE LOCAL ENVIRONMENT;*

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[4] **Thanet District Council (2017), Thanet Local Plan 2006 Saved Policies**[Accessed online on 29/02/2018 at https://www.thanet.gov.uk/your-services/planning-policy/thanets-current-planning-policy/thanet-local-plan-2006//]

F. INCORPORATES NEW LANDSCAPING AS AN INTEGRAL PART (AS SET OUT IN POLICY D2);

G. INCORPORATES, WHERE APPROPRIATE, WILDLIFE HABITATS, WILDLIFE CORRIDORS AND INITIATIVES FOR THEIR LONG TERM MANAGEMENT;

H. INCORPORATES MEASURES TO PREVENT CRIME AND DISORDER, PROMOTES PUBLIC SAFETY AND SECURITY AND THE PERCEPTION OF PUBLIC SAFETY AND SECURITY;

I. INCORPORATES, WHERE PRACTICAL AND APPROPRIATE, HIGH QUALITY INTEGRATED PUBLIC ART WHICH IS RELEVANT TO THE SITE AND LOCALITY;

J. PROVIDES SAFE AND SATISFACTORY MEANS OF PEDESTRIAN AND, WHERE PROVIDED, VEHICLE ACCESS;

K. PROVIDES FOR CLOTHES DRYING FACILITIES AND REFUSE DISPOSAL[1] OR DUSTBIN STORAGE; AND THANET LOCAL PLAN - June 2006 163

L. INCORPORATES SUSTAINABLE DRAINAGE SYSTEMS.

(POLICY NOT SAVED) EP12 - SURFACE WATER RUN-OFF

DEVELOPMENT CONTRIBUTING TO AN UNACCEPTABLE FLOOD RISK DUE TO SURFACE WATER RUN-OFF WILL NOT BE PERMITTED. WHEREVER PRACTICABLE, THE INCLUSION OF SUSTAINABLE DRAINAGE SYSTEMS WILL BE REQUIRED TO ENSURE THAT SURFACE WATER RUN-OFF IS NOT INCREASED.

POLICY EP13 - GROUNDWATER PROTECTION ZONES

IF A PROPOSED DEVELOPMENT IN THE GROUNDWATER PROTECTION ZONES IDENTIFIED ON THE PROPOSALS MAP WOULD HAVE THE POTENTIAL TO RESULT IN A RISK OF CONTAMINATION OF GROUNDWATER SOURCES, IT WILL NOT BE PERMITTED UNLESS ADEQUATE MITIGATION MEASURES CAN BE INCORPORATED TO PREVENT SUCH CONTAMINATION TAKING PLACE".

3 CONSULTATION

3.1 Consultation with the following bodies has been undertaken:

- Environment Agency (EA); and
- KCC.

3.2 The EA confirmed that the site is within Flood Zone 1 with no history of flooding.

'We can confirm that we have no record of flooding from rivers and/or the sea for this location, or within a 3km radius.'

3.3 They have also confirmed that the underlying geology of the site is chalk and that there is low risk of groundwater flooding given the sites elevation.

'Given the elevated position of the site, groundwater flooding should not be a problem. However, we do have records of flooded cellars in properties in Monckton and Minster. These are associate with the spring line created by the solid strata (Cretaceous Chalk and Palaeocene Thanet Beds) being overlain by impermeable superficial deposits in the Stour valley.'

3.4 EA consultation response is attached in Appendix A.

3.5 A meeting was undertaken with KCC on the 30th of August 2017. Following the meeting, KCC issued a response regarding the outline drainage strategy. The full response, attached in Appendix A highlights the following;

a) *'The outline drainage plan (Drawing NK018417-RPS-B01-DR-S-2020) tabled shows that:*

   i. *The discharge to the outfall to Pegwell Bay is retained*

   ii. *Pumping will be required on site to discharge to existing connection*

   iii. *Space for attenuated storage is provided based on indicative site coverage*

b) *The Outline Drainage Strategy prepared by RPS (RCEF54574-002) in July 2017 was also provided for reference. This document provides greater detail on the areas of development and highlights matters for consideration with respect to water quality.*

c) *Design will be undertaken with an assumed pumped discharge rate of 30 l/s and that the outfall sewer line has a diameter of 900 mm.*

d) *It is KCC's understanding that a CCTV survey has been undertaken of the entire length to the outfall. RPS is aware that works have been undertaken but have not sighted this*

e) *KCC provide no specific direction as to the form of the drainage measures which should be included within the drainage design but would encourage consideration of the policies as stated within the KCC Drainage and Planning Policy Statement. It is noted that as an airport operation there may be specific requirements which override the policy statement. We would encourage full consideration of sustainable drainage measures given the water quality benefits which may be provided.*

f) *Utilisation of the Pegwell Bay outfall is appropriate.*

g) *This discharge destination in its own right will not require attenuation but that for operational matters in relation to pump operation and water quality treatment issues that storage for water will be required.*

h) *There should be no expectation of discharge to ground due to potential contamination issues and underlying geology.*

i) *The volume of the attenuation basins may depend more on treatment requirements and timing of storm events with respect to pump operations.*

j) *Additional design requirements for the ponds may be specified by firefighting requirements. KCC will take direction from other authorities with respect to any additional considerations e.g. underground tanks rather than surface feature.*

k) *It is beneficial that a clear summary of impermeable areas is provided.*

l) *Surface water catchment areas should be delineated. Not all drainage catchments will require treatment e.g. roof areas. Separation of 'clean' from 'dirty' areas should be provided as much as possible/feasible.*

m) *A reduction of impermeable areas is considered as much as possible, not given drainage network constraints but given the additional water quality treatment which will be required.*

n) *Consideration should be given to the inclusion of permeable pavements, even if lined, to provide for treatment and reduce any additional attenuation volumes which may be required. This may be applicable to areas outside of aviation operations.*

o) *We would refer you to KCC's Drainage and Planning Policy Statement with respect to drainage design criteria notably: no surcharge for 1 in 30 year rainfall events, allowance of above ground flooding for 1 in 100 year rainfall event, but that any surface water must remain within the site and not flood any property.*

p) *Design must allow for 20% climate change but assess sensitivity of system to 40% allowance.*

q) *Any detailed submission will be expected to be supported by a condition survey of the outfall pipe. This will be expected at later stages of planning approval if not already undertaken'*

3.6 There are existing public sewers within the vicinity of the site however given that the Proposed Development intends to outfall into Pegwell Bay via the airport existing sewers, no pre-development enquiry has been undertaken with SW.

4 SITE DESCRIPTION

Site Description

4.1 The site is located at National Grid Reference TR 33284 65895. It is roughly triangular in shape, occupying an area of approximately 303.186 hectares (ha).

4.2 The site is currently a disused airfield which was initially developed and used during the First and Second World War. It was temporarily used for commercial flights post war until its eventual closure on the 15th of May 2014.

4.3 Vehicular access to the site is provided via the A299 Hengist Way to the south and the B2050 Manston Road/Spitfire Way to the north.

4.4 Pedestrian access to the site is limited. Given the nature of the development however, access is available via Manston Road.

4.5 The existing site is currently occupied by approximately 98.915 ha (31.75%) of impermeable area, consisting of buildings, highways, runways and taxiways. The remaining 204.271 ha (68.25%) of the site is covered by permeable surfacing, mainly grass area and soft landscaping.

4.6 A site location plan and an existing catchment plan are attached in Appendix B.

4.7 The site is not located within any Special Area of Conservation (SAC) or Special Protection Area (SPA).

Surrounding Land Uses

4.8 The site is located within a primarily rural area. Urban areas of Margate, Manston, Pegwell Bay and Minster surround the site to the north, east, south and west. Pasturable fields surround the site immediate boundary.

4.9 The Spitfire & Hurricane Memorial Museum, a holiday park and a heliport are located along Manston Road.

4.10 The closest watercourse to the site is the North Sea with the nearest distance being 2.00km to the south east of the site.

Topography

4.11 A topographic survey was undertaken by SLC Associates in June 1999 and is attached in Appendix C. The survey indicated the following:

- The northern section of the site has a fall from 46.500 to 47.900m AOD approximately to the north;

- The eastern section of the site has a fall from 46.400 to 45.600m AOD approximately to the south-east;
- The southern section of the site has a fall from 50.500 to 54.000m AOD approximately to the south;
- The western section of the site has a fall from 52.000 to 49.600 approximately to the south;
- Centrally the site is relatively flat with levels in the range of 52.00 to - 54.000m AOD; and
- The existing runway (to be utilised for the proposed development) inhibits a shallow cross fall from 52.350 to west and 51.600 to east. The centre of the runway is raised up to 54.500m AOD approximately.

4.12 Based on the size and nature of the site, the topography of the site is considered to be relatively flat with gradual gradient towards the southern boundary.

Geology

4.13 Reference to the BGS[5] online mapping (1:50,000) indicates that there are no recorded superficial deposits however the site is shown to be underlain by bedrock deposits of the Margate Chalk Member – Chalk. It is described as comprising of Marl-free smooth white chalk with little flint, weakly developed indurated iron-stained sponge beds.

4.14 There are a series of trial pit logs situated in the centre of the site. The trial pits generally confirm the geology as identified within the BGS mapping. Five records have been reviewed[6]; (BGS ref. TR36NW76, TR36NW77, TR36NW78, TR36NW79, TR36NW80) which identified the presence of clay and chalk within the depth of 1.90- 2.30m below ground level respectively.

4.15 The soil is described as approximately 'freely draining slightly acid loamy soils' by the National Soil Resources Institute[7].

[5] **British Geological Survey (2017), Geology of Britain Viewer** [Accessed online on 09/11/2017 at http://mapapps.bgs.ac.uk/geologyofbritain/home.html?]

[6] **British Geological Survey (2017), Borehole Record Viewer** [Accessed online on 09/11/2017 at http://www.bgs.ac.uk/data/boreholescans/home.html]

[7] **National Soil Resources Institute (2017), Soilscapes** - [Accessed online on 09/11/2017 at http://www.landis.org.uk/soilscapes/about.cfm]

5 PROPOSED DEVELOPMENT

5.1 The Proposed Development is to recommission a disused airfield for the opening of Manston International Airport. The airport is to be utilised for commercial and business use as well as other aviation related activities. The development will also look to construct a business park within the northern section of the site.

5.2 A summary of the works to be undertaken as part of the proposed development are presented below;

- upgrade of Runways 10 & 28 to allow CAT II/III operations;
- realignment of the parallel taxiway (Alpha) to provide EASA compliant clearances for runway operations;
- construction of 19 EASA compliant Code E stands for air freight aircraft with markings capable of handling Code D and F aircraft in different configurations;
- installation of new high mast lighting for aprons and stands;
- construction of 65,500m² of cargo facilities;
- construction of a new ATC tower;
- construction of a new airport fuel farm;
- construction of a new airport fire station
- complete fit-out of airfield navigational aids (nav-aids);
- construction of new aircraft maintenance/recycling hangars;
- development of the 'Northern Grass Area' for airport related businesses;
- demolition of the redundant 'old' ATC Tower;
- Safeguarding of existing facilities for museums on the site;
- highway improvement works, both on and off site; and
- extension of passenger service facilities including an apron extension to accommodate an additional aircraft stand and increasing the current terminal size.

5.3 The site area is approximately 303.186 hectares in total.

5.4 The Proposed Development will impact the existing breakdown of areas, as there will be a need to construct on existing greenfield area. Post-development, the overall impermeable area within site would be 169.479 ha (55.90%) with a remaining permeable area of 133.707 ha (44.10%).

5.5 Out of the 169.479 ha of impermeable area, 19.884 ha would consist of buildings, 3.052 ha would be made of the existing museum impermeable area and 146.543 ha would be made of hardstand highways, runways and taxiways. The permeable area meanwhile will consist of existing greenfield and soft landscaping.

5.6 The existing and proposed catchment plan is included in Appendix D.

6 SURFACE WATER POLLUTANTS

Surface Water Pollutants

6.1 Surface water runoff generated within airport areas can cause serious environmental problem due to high levels of contaminants associated to aviation activities. It is not possible to discharge surface water runoff generated within airport areas without an adequate treatment system.

6.2 The sources of pollution that will need to be considered as part of airport drainage system include but not limited to the following:

- Exhaust Fumes – *take offs, landings and taxiing;*
- Fuel & Lubricant Spillages – *refuelling and maintenance of aeroplanes; and*
- De-icing & Washing – *glycol anti-freeze agent;*

6.3 The EA's Scoping guidance on the environmental impact assessment of projects"[8] states that in order to minimize potential impacts on the water environment in the design and running of airports and airfields must ensure that:

- an appropriate water management system is used, including, for example, efficient land drainage and the use of constructed ponds for receiving site runoff to reduce the impact of runoff on nearby water courses;
- SuDS should be used to alleviate flooding, improve water quality and ensure recharge of groundwater base flows;
- hazardous or potentially polluting materials such as fuel, oil or wastes must be sited on an impervious base away from water, properly bunded, and kept locked when unattended;
- less polluting and less hazardous de-icers are used (e.g. glycol-free);
- all discharge waters are treated prior to discharge in to controlled waters;
- oil/water separators are used or drip trays are used in vehicle parking areas, and are inspected and cleaned regularly;

[8] **Environment Agency (2001), Scoping the Environmental Impacts of airports and airfields** [Accessed online on 09/11/2017 at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297106/geho0411btsc-e-e.pdf]

- a risk assessment is carried out to consider the implications of accidents – particular on take-off when fuel loadings are high, and the appropriate containment measures installed;
- an Emergency Plan is formulated and tested through exercises to ensure that procedures to prevent or mitigate impacts due to accidents or spillages are in place and operate effectively (some developments may require such plans to be formulated and the EA should be consulted to identify where this is the case); and
- designated areas (ideally with connection to foul sewer) for disposal of spent or excess fire-fighting foams

Water Treatment Systems

6.4 Surface water runoff generated within areas where pollutants could present will be treated prior to discharge. The treatment systems would need to remove contaminates addressed above.

6.5 It is recommended that the system below be considered at detailed design stage;

- ***Light Liquid Separator*** – a type of oil water separator used specifically to clean water polluted with light free floating liquids such as glycol and petrol.
- ***Activated Sludge Aeration Tank*** – a type of treatment which relies on biological oxidization of carbonaceous and nitrogenous matter by removing nutrients in the form of sludge as a means to treat wastewater.
- ***Forced Bed Aeration*** – also known as aerated reed bed is a shallow pond system fed with a perforated pipe network through a filter media which is fully submerged and saturated with oxygen; plants are used to remove and absorb pollutants from waste water as treatment.

7 EXISTING DRAINAGE ON SITE

Existing Drainage System

7.1 SW provided a series of utility plans illustrating their drainage assets within the site and the surrounding area. The plans are attached in Appendix E.

7.2 There are no public surface water sewers within the site. The closest SW sewer is a combined sewer located north east of the site, in the village of Manston. The combined sewer network consists of gullies, 100mm – 300mm diameter carrier pipes along with the associated manhole chambers.

7.3 It is understood that there is a private surface water network within the site. A utility survey, undertaken by WSP in October 2015 confirmed that there is a full surface water network within the site that can be reused. The survey, attached in Appendix E shows that the existing surface water network consists of gullies, 450mm to 1200mm diameter carrier pipes, a pumping station and associated manhole chambers.

7.4 The pumping station located immediately south of B2050, is believed to convey surface water runoff generated within the existing hangar towards an existing chamber located west of the site, next to the existing runaway. From the chamber, all surface water runoff collected from the existing site will then flow via gravity towards Pegwell Bay, located 2 km south-east off the site boundary.

7.5 At the time of writing, it is not known what the pumping rates and characteristics (standby or duty) are. This should be determined prior to detailed design stage.

Existing Outfall

7.6 The existing outfall is located at Pegwell Bay, 2 km south east of the site boundary. The outfall line, starting from the southeastern edge of the site is approximately 1.8 km long.

7.7 A CCTV survey of the outfall line was undertaken by RPS in April 2017. Other than debris in some section of the pipes, the survey shows that the overall condition of the outfall line is in a good working order. There will however be a need to flush the system and undertake a detailed survey to identify which sections of the outfall line would need to be repaired or made good.

7.8 The headwall of the proposed outfall is located at Pegwell Bay. A screen consisting of flat bars at approximately 100mm spacing is attached at the end of the headwall. A channel, approximately 14 m long direct flows from the headwall to the sea.

7.9 Based on a site walkover undertaken, the channel is partially buried by sand. There will be a need to clean, repair and refurbish the channel as part of the Proposed Development.

Design Rainfall

7.10 The rainfall used to derive the surface water runoff rates and volumes was obtained from the Flood Estimation Handbook (FEH) Web Service[9], depth-duration-frequency model[10]. This provides design rainfall intensities for a range of return periods and storm durations, which are presented in .

7.11 Table 1.

Table 1 - Design rainfall intensities (mm)

	Storm Durations (hr)						
	1	2	3	5	12	24	48
2	14.1	18.9	21.9	25.9	32.5	37.9	44.7
5	19.7	25.2	28.7	33.3	41.3	48.0	56.0
10	24.3	30.2	34.1	39.4	49.3	58.0	67.9
30	32.0	39.0	43.8	50.9	66.8	83.4	99.1
50	35.9	43.6	49.1	57.6	77.9	97.9	115.5
100	41.7	50.6	57.4	68.5	94.8	117.6	136.8
100+5%	43.7	53.1	60.3	71.9	99.5	123.5	143.7
100+10%	45.8	55.6	63.2	75.4	104.3	129.3	150.5
100+20%	50.0	60.7	68.9	82.2	113.7	141.1	164.2
100+30%	54.2	65.8	74.6	89.1	123.2	152.9	177.9
100+40%	58.3	70.8	80.4	95.9	132.7	164.6	191.5

Climate Change

7.12 Climate change is currently predicted to increase the wetness of winters and the dryness of summers. The intensity of storm events is anticipated to increase with rises of 5% expected by 2025, 10% by 2055, 20% by 2085 and 30% by 2115. This will have an impact on the volume of rainfall that will fall at the site, with rainfall increasing from 41.7mm for the 1% AEP storm, with duration of 1 hour, to 58.3 mm for the 1% AEP storm plus 40%.

Existing Surface Water Runoff Rates

7.13 The existing site, with an area of 303.186 ha is 32.62% impermeable.

7.14 The Wallingford Modified Rational Method[11] has been used to estimate the surface water runoff generated during peak rainfall events based on the nature of the ground surface (hard standing, vegetation, etc) and rainfall depth, duration and frequency information for the immediate area. A

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[9] **Centre for Ecology & Hydrology (2017), Flood Estimation Handbook (FEH)** [Accessed online on 09/11/2017at https://fehweb.ceh.ac.uk/]

[10] **The lowest design rainfall provided by FEH is based on 1 in 2 year rainfall event at 1 hour duration. As such, it is not possible to assess the 1 in 1 year rainfall event and storm duration less than 60 minutes.**

[11] **The Wallingford Modified Rational Method is an extension of the rational method to produce simple runoff hydrographs. Application of the Modified Rational Method produces a runoff hydrograph and runoff volume in contrast to application of the rational method, which produces only the peak design discharge.**

runoff coefficient of 1 and 0.3 was applied for the impermeable and the permeable areas in line with best practise for surface water runoff estimation.

7.15 The results of this calculation for a range of return periods, including climate change, are presented in Table 2.

Table 2 - Existing Surface Water Runoff rates (l/s)

	Storm Durations (hr)						
	1	2	3	5	12	24	48
2	6256.6	4198.5	3248.4	2302.4	1205.2	702.5	414.2
5	8766.3	5598.0	4254.1	2961.0	1533.0	890.5	518.8
10	10799.9	6721.6	5062.5	3506.5	1827.8	1075.6	629.1
30	14239.7	8677.3	6499.8	4533.6	2477.5	1546.3	918.4
50	15970.7	9707.5	7284.5	5127.2	2888.4	1814.8	1070.3
100	18538.3	11256.0	8517.1	6097.2	3514.7	2180.1	1268.4
100+5%	19465.2	11818.8	8943.0	6402.1	3690.4	2289.1	1331.8
100+10%	20392.1	12381.6	9368.8	6707.0	3866.1	2398.1	1395.2
100+20%	22245.9	13507.2	10220.5	7316.7	4217.6	2616.1	1522.1
100+30%	24099.8	14632.8	11072.2	7926.4	4569.1	2834.1	1648.9
100+40%	25953.6	15758.4	11923.9	8536.1	4920.5	3052.1	1775.8

7.16 As presented, the estimated 1 in 2 year, 1 hour run-off rate for the existing development is approximately 6256.6 litres per second (l/s), whilst the 100-year, 1 hour run-off is 18538.3 l/s. The currently expected impacts of climate change based on the year 2115 (assuming an expected lifespan of the development of at least 100 years) would increase this by 40% to 25953.6 l/s for the site.

Greenfield Runoff Rate, Q_{BAR}

7.17 The greenfield run-off rate for the site boundary was calculated using the Interim Code of Practice for Sustainable Drainage Systems (ICP SuDS) method and the Institute of Hydrology Report 124 (IoH 124) method.

7.18 The results, attached in Appendix F, shows that the QBAR based on an overall impermeable area of 169.479 ha are 459 l/s for both ICP SuDS and IoH 124.

Allowable Discharge Rate

7.19 The existing surface water drainage network for the site discharges freely via an outfall at Pegwell Bay.

7.20 As mentioned in Section 7.4, there is an existing pump being utilised to convey surface water runoff within the site. The pump rates and setup are not known at the time of writing. The pump will need to be assessed and inspected in order to establish a suitable rate and to size proposed drainage features accordingly at detailed design stage.

7.21 Prior to discussion with KCC, a pump rate of 30 l/s was assumed and utilised for attenuation estimation. However, after further consideration and based on existing surface water runoff rates calculated and illustrated in Table 2 and the Q_{BAR}, it is decided that a higher rate should be assumed for the purposed of this conceptual surface water drainage strategy.

8 PROPOSED SURFACE WATER DRAINAGE STRATEGY

Post-development Surface Water Runoff Rates

8.1 Given that the existing site is a disused airport and is considered 32.62% impermeable, the Proposed Development will take up some existing greenfield for renovation works as well as the development to the north of the site. The Proposed Development will take up an additional 73.227 ha as impermeable area.

8.2 As a result, the permeable area will decrease by 39.61 % from 221.43 ha to 133.701 ha.

8.3 Table 3 below shows the surface water runoff generated post-development from the hardstanding areas of the Proposed Development.

Table 3 – Post-development surface water run-off rates (l/s)

	Storm Durations (hr)						
	1	2	3	5	12	24	48
2	8185.6	5493.0	4250.0	3012.3	1576.8	919.1	541.9
5	11469.2	7324.0	5565.8	3873.9	2005.7	1165.1	678.7
10	14129.8	8794.0	6623.4	4587.7	2391.4	1407.2	823.1
30	18630.2	11352.8	8503.9	5931.4	3241.4	2023.1	1201.6
50	20894.9	12700.5	9530.5	6708.0	3778.9	2374.4	1400.3
100	24254.1	14726.6	11143.2	7977.2	4598.4	2852.3	1659.5
100+5%	25466.8	15462.9	11700.3	8376.1	4828.3	2994.9	1742.5
100+10%	26679.6	16199.2	12257.5	8774.9	5058.2	3137.5	1825.4
100+20%	29105.0	17671.9	13371.8	9572.6	5518.0	3422.7	1991.4
100+30%	31530.4	19144.5	14486.1	10370.4	5977.9	3707.9	2157.3
100+40%	40434.0	33106.9	24720.2	20101.8	17219.4	15210.4	13720.9

8.4 The 1 in 2 year, 1 hour runoff rate for the Proposed Development is approximately 8185.6 l/s whilst the 100-year, 1 hour runoff is 24254.1 l/s. The currently expected impacts of climate change (based on an expected lifespan of the development of 100 years) would increase this by 40% to 40434 l/s.

8.5 The Proposed Development will therefore decrease surface water runoff generated within the site.

Policy

8.6 The NPPF requires that the Proposed Development should not increase flood risk. Therefore, surface water runoff from the site should not exceed that generated from the existing application site i.e. betterment should be provided.

8.7 The National Planning Practice Guidance (NPPG) outlines the hierarchy to be investigated by the developer when considering surface water drainage strategy. The following drainage options are to be investigated following order of priority:

1. Discharge rainwater into ground via infiltration;
2. Discharge rainwater direct to a watercourse;
3. Discharge rainwater to a surface water sewer/drain; and
4. Discharge rainwater to the combined sewer.

8.8 All of the drainage options are examined in detail in order to assess the feasibility of using a combination of SuDs as part of the Proposed Development.

Surface Water Drainage Strategy Hierarchy

Discharge rainwater into ground via infiltration

8.9 No soil infiltration testing was undertaken on site at the time of writing.

8.10 A desktop based study has been undertaken and consultation with the EA confirms the onsite geology to comprise of predominately chalk which is permeable.

8.11 Given the nature of the Proposed Development the surface water pollutants are likely to infer land contaminations and groundwater quality issues should infiltration be considered.

8.12 Based on this finding, discharge via infiltration has not been explored any further.

Discharge rainwater direct to a watercourse

8.13 The nearest watercourse to the site is the North Sea, located approximately 2 km south east of the site.

8.14 Given that there is an existing surface water system within the site eventually discharges into the North Sea, the proposed development will look to utilise the existing system. The capacity and the condition of the existing system will be investigated at detailed design stage, to assure it is fit for purpose.

Discharge rainwater to a surface water sewer/drain

8.15 There are no surface water sewers within the vicinity of the site. Given the size of the development, it is likely that the existing public sewer would have insufficient capacity to receive and convey runoff generated within the development.

Discharge rainwater to the combined sewer

8.16 Given the nature of the development it is highly likely that the existing combined sewer network that serves Manston village will not have sufficient capacity.

8.17 This would suggest that significant additional infrastructure works would need to be carried out in order to discharge via combined sewer network which is considered not cost effective. On this basis, discharge of surface water runoff into the combined sewer will not be considered further.

Proposed Surface Water Drainage Strategy

8.18 Given the size of the development and varying activities within site, the proposed surface water drainage strategy will split the proposed drainage system as follows;

(1) Drainage for surface water runoff generated by impermeable areas where surface water runoff could possibly be contaminated (i.e. airport runways, taxiways);

(2) Drainage for surface water runoff generated by the proposed buildings within the proposed airport area;

(3) Drainage for surface water runoff generated by the proposed access road and buildings within the business park; and

(4) Drainage for surface water runoff for the fuel farm situated in the south east of site boundary.

8.19 The proposed surface water drainage strategy are based on the following parameters:

- The proposed drainage system is to be designed to assure that there is no surface water flooding within site for rainfall event up to 1 in 100 year plus 40% climate change effect;
- Surface water runoff generated within areas with possible contaminants are to be treated and attenuated prior to discharge;
- Surface water runoff generated by the roof of proposed buildings within the airport site will be collected and conveyed towards the pumping station, no attenuation will be provided and existing pumps are assumed to be adequate to pump runoff forward;
- Surface water runoff generated by the roof of proposed buildings, access road and footway associated with the business park to be attenuated within a permeable pavement for water quality purposes prior to discharge into ground;
- The proposed drainage system will utilise the existing approximately 1.8 km outfall line; and
- Surface water runoff will eventually be discharged into North Sea via an existing outfall located 2 km away along Pegwell Bay.

8.20 The proposed drainage strategy reasonably assumed that the existing pumps are in acceptable condition with sufficient pumping rates. It is envisaged that at detailed design stage, the setup of the existing pumps and its condition would be investigated and if deemed unsuitable, will be replaced with new pumps with adequate rates.

Contaminated Surface Water

8.21 A total impermeable area of 133.249 ha is to be used as airport aprons, taxiways, runways and roads. Surface water runoff generated within these areas could potentially be contaminated. Light Liquid Separators would be utilised to treat the surface water runoff.

8.22 Treated runoff will then be forwarded to the first attenuation pond to allow for sedimentation and further treatment, if required. At this stage it is not yet determined whether to utilise Aerated Reed Bed System or an Aeration Tank for treatment. The secondary pond will be utilised for attenuation purposes. Treated surface water runoff will then be passed forward to the existing pumping station and eventually discharged into the North Sea via the existing outfall line.

8.23 At this stage, a passed forward flow rate of 100 l/s is assumed to size the attenuation requirements for the ponds. This rate would need to be considered at detailed design stage, to assure that the pass forward flow rate is acceptable to allow for sufficient treatment (i.e. sedimentation/aeration) to be provided. Additionally, if the pass forward flow rate does not impact treatment and the existing pumps have the capacity to pass forward higher flow rates, then the 100 l/s limiting rate should be increased to a reasonable value to minimise the depth of ponds.

8.24 A Quick Storage Estimate® was undertaken using MicroDrainage®. Based on a 1 in 100 year plus 40% climate change effect and a limiting pass forward flow rate of 100 l/s an average volume of 155,010 m^3 would be required. In order to provide attenuation for this volume, the proposed ponds with a total area of 26,000 m^2 would need to be approximately 5.96 m deep.

Uncontaminated Surface Water

8.25 Surface water runoff generated from the roof of the proposed buildings within the airport area will be collected and conveyed towards the existing pumping station to be pumped and discharged into Pegwell Bay. No treatment or attenuation would be provided.

8.26 Surface water runoff generated from the roof of the proposed buildings and associated car park within the business park meanwhile will be collected and attenuated via SuDS features such as permeable pavement and porous carpark. These features would remove traffic related pollutants from runoff generated from the car park and provide attenuation. Surface water runoff will then eventually be discharged into ground via infiltration.

8.27 Surface water runoff generated by the existing and proposed road within the business car park will be discharged into the highway network.

Fuel Farm surface Water

8.28 The Fuel Farm is located at the south eastern edge of the site. Due to the location, the surface water runoff generated within the fuel farm will be treated independently from the whole site.

8.29 Surface water runoff generated from the fuel bund will be pumped into a new surface water drainage system. The method of pumping is yet to be determined and will be confirmed at detailed design stage.

8.30 Surface water runoff generated from the parking areas, access roads and other impermeable surfaces will be collected and passed through a full retention oil water separator, prior to discharge. An anti-pollution non-return control valve will be introduced as a secondary measure to maintain and control pollutants in accordance with the requirements set out by the Environment Agency.

8.31 A new saddle connection is to be constructed on the existing outfall line. Treated surface water runoff from the fuel farm will be discharged into the existing outfall line freely.

8.32 Storing of oil, design standards for fuel tanks and containers, will be in accordance to Environment Agency's requirements[12].

8.33 Refer to Appendix G for the conceptual surface water drainage layout.

[12] **Oil storage regulations for businesses (2017), Environment Agency** [Accessed online on 09/11/2017 at https://www.gov.uk/guidance/storing-oil-at-a-home-or-business]

9 CONCLUSIONS

9.1 The following conclusions can be made regarding the Drainage Assessment to the development site:

- The site is irregular triangle in shape and occupies an area of approximately 303.186 ha;
- The site is currently a disused used airfield with significant greenfield and is currently 204.271 ha permeable;
- The closest watercourse is the North Sea, located approximately 2 km southeast of the site boundary;
- The site is relatively flat with gradual gradient towards the southern boundary;
- The Proposed Development will take up existing greenfield for the construction of additional hardstanding area which will reduce the permeable area to 133.707 ha;
- The estimated 1 in 2 year, 1 hour run-off rate for the existing development is 6256.6 litres per second (l/s), whilst the 100-year, 1 hour run-off is 18538.3 l/s. The currently expected impacts of climate change based on the year 2115 (assuming an expected lifespan of the development of at least 100 years) would increase this by 40% to 25953.6 l/s for the site;
- The 2 year, 1 hour runoff rate for the proposed development meanwhile is approximately 8185.6 l/s whilst the 100-year, 1 hour runoff is 24254.1 l/s. The currently expected impacts of climate change (based on an expected lifespan of the development of 100 years) would increase this by 40% to 40434 l/s;
- The proposed drainage system is to be designed to assure that there is no surface water flooding within site for rainfall event up to 1 in 100 year plus 40% climate change effect;
- Surface water runoff generated from area with possible contaminants to be treated via a combination of light liquid separator and aeration system. Treatment and attenuation to be provided within the attenuation ponds. A reasonable passed forward flow rate of 100 l/s is assumed to size the attenuation ponds and to allow for sufficient treatment. If the pass forward flow rate does not impact treatment and the existing pumps have the capacity to pass forward higher flow rates, the limiting rate of 100 l/s should be increased to minimise the depth of ponds. Based on a 1 in 100 year plus 40% climate change effect and a limiting pass forward flow rate of 150 l/s, an average volume of 155,010 m^3 would need to be provided within the two ponds;

- Surface water runoff generated from the roof of the proposed buildings and associated car parks within the business park will be collected and attenuated using SuDS features such as permeable pavement and porous carpark. Surface water runoff generated by the existing and proposed access road meanwhile will be discharged into the existing highway drainage network;

- SuDS features such as permeable pavement and porous car park would remove traffic related pollutants from the runoff and for attenuation purposes;

- The existing pumping rate would need to be adequate to assure that there is no flooding within site at 1 in 100 year plus 40% climate change effect. This will be investigated further at detailed design stage;

- Surface water generated by the Fuel Farm will be treated via Oil Water Separator. An anti-pollution non-return control valve will be introduced as a secondary measure to maintain and control pollutants in accordance with requirements set out by the Environment Agency; and

- The existing 1.8km outfall line would be utilised to discharge surface water runoff generated from the development to North Sea. An existing headwall, located at Pegwell Bay, will be refurbished and repaired to suit.

Appendix A

Consultation Responses

PRE-APPLICATION MEETING
Meeting Notes

Date/Time :	30 August 2017, 12:00 till 14:00
Location :	Reculver Room, 3rd Floor, Invicta House, County Hall
Attendees:	RPS Group - Rizal Roney, Ersum Shahid Amex – Ben Fretwell KCC – Bronwyn Buntine, Joseph Williamson
Site Location:	Manston Airport, Manston Road, Manston, Ramsgate, CT12 5BQ
LPA District reference:	Not applicable
KCC reference:	NON/2017/062042

Discussion Items

1. Objective
   - Provide background to new development proposal
   - Review approach to drainage design
   - Confirm information needed and respond to the following specific enquiries:
     a. Any requirements the Council may have on surface water management at the proposed development;
     b. Measures to manage surface water and preferred SuDS techniques;
     c. Water Quality requirements;
     d. Any other requirements relative to the DCO from Surface Water point of view; and
     e. If a Flood Risk Assessment (FRA) will be required.

2. Development Proposal
   - River Oak Strategic Partnership has developed a new development proposal at Manston which incorporates the existing airport facilities, new passenger terminal, provides for other associated activities as well as a commercial area
   - The plans have been submitted for consideration as a 'Nationally Significant Infrastructure Project' as defined by the Planning Act 2008; an application will be made to the Planning Inspectorate for a Development Consent Order (DCO)

3. Surface water management drainage design
   a) The outline drainage plan (Drawing NK018417-RPS-B01-DR-S-2020) tabled shows that:
      i. The discharge to the outfall to Pegwell Bay is retained
      ii. Pumping will be required on site to discharge to existing connection
      iii. Space for attenuated storage is provided based on indicative site coverage
   b) The Outline Drainage Strategy prepared by RPS (RCEF54574-002) in July 2017 was also provided for reference. This document provides greater detail on the areas of development and highlights matters for consideration with respect to water quality.
   c) Design will be undertaken with an assumed pumped discharge rate of 30 l/s and that the outfall sewer line has a diameter of 900 mm.
   d) It is KCC's understanding that a CCTV survey has been undertaken of the entire length to the outfall. RPS is aware that works have been undertaken but have not sighted this

information.

e) KCC provide no specific direction as to the form of the drainage measures which should be included within the drainage design but would encourage consideration of the policies as stated within the KCC Drainage and Planning Policy Statement. It is noted that as an airport operation there may be specific requirements which override the policy statement. We would encourage full consideration of sustainable drainage measures given the water quality benefits which may be provided.

KCC agree that:

f) Utilisation of the Pegwell Bay outfall is appropriate.

g) This discharge destination in its own right will not require attenuation but that for operational matters in relation to pump operation and water quality treatment issues that storage for water will be required.

h) There should be no expectation of discharge to ground due to potential contamination issues and underlying geology.

i) The volume of the attenuation basins may depend more on treatment requirements and timing of storm events with respect to pump operations.

j) Additional design requirements for the ponds may be specified by firefighting requirements. KCC will take direction from other authorities with respect to any additional considerations e.g. underground tanks rather than surface feature.

With respect to approach of surface water management strategy, KCC recommend that:

k) It is beneficial that a clear summary of impermeable areas is provided.

l) Surface water catchment areas should be delineated. Not all drainage catchments will require treatment e.g. roof areas. Separation of 'clean' from 'dirty' areas should be provided as much as possible/feasible.

m) A reduction of impermeable areas is considered as much as possible, not given drainage network constraints but given the additional water quality treatment which will be required.

n) Consideration should be given to the inclusion of permeable pavements, even if lined, to provide for treatment and reduce any additional attenuation volumes which may be required. This may be applicable to areas outside of aviation operations.

o) We would refer you to KCC's Drainage and Planning Policy Statement with respect to drainage design criteria notably: no surcharge for 1 in 30 year rainfall events, allowance of above ground flooding for 1 in 10 year rainfall event, but that any surface water must remain within the site and not flood any property.

p) Design must allow for 20% climate change but assess sensitivity of system to 40% allowance.

KCC require that:

q) Any detailed submission will expected to be supported by a condition survey of the outfall pipe. This will be expected at later stages of planning approval if not already undertaken.

4. <u>Water quality issues</u>

- Operation at the airport will provide a potential water quality pollutant source.
- Water quality issues will require additional consideration.
- It is not understood what the current discharge point for contaminated water is.
- It has not been confirmed if discharge consent will be required by EA.
- KCC do not have specific consenting responsibilities with respect to water quality.

KCC recommend that:

a) As stated above that 'dirty' and 'clean areas are separated as much as possible.

5. Future conditions for planning approval

- Further detailed information will be required to support any determination.
- As this site is over 1 ha, any Flood Risk Assessment would largely be a Drainage Strategy.
- RPS note that there has been reference to a Drainage Impact Statement. This is not a terminology that KCC use and it is assumed that it would relate to the public sewerage system.

It is anticipated that KCC will require conditions in relation to :

a) Sustainable drainage strategy, which refers to detailed design of the drainage system and should define all assumptions, areas and include appropriate calculations.
b) Outfall condition such that the outfall to Pegwell Bay is inspected and confirmed as an appropriate outlet
c) Management and maintenance expectations to outline actions and responsible parties for maintenance.

Follow-up Items

[1] KCC to share information with EA colleagues.

Ersum Shahid

From: Rizal Roney
Sent: 10 August 2017 17:13
To: Ersum Shahid
Subject: FW: KSL 55149 LB FW: Attached Image
Attachments: 0802_001.pdf; Fleete Res GWL D.mean.csv; Alland Grange GWL D.mean.csv; Plucks.csv

---

From: KSL Enquiries [mailto:KSLE@environment-agency.gov.uk]
Sent: 07 August 2017 15:33
To: Rizal Roney
Subject: [EXT] KSL 55149 LB FW: Attached Image

Dear Rizal Roney

RE: KSL 55149 LB FW: Attached Image

Thank you for your enquiry which was received on 11 July 2017.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Further to my email dated 02/08/2017, we have obtained further information regarding groundwater levels. Please also find attached groundwater records at our monitoring borehole at Plucks Gutter (4900m southwest). Please also see further information (in blue) on your question below '*Details of groundwater levels in the vicinity of the site and of the risk of rising groundwater levels and provision of mapping (AStGWF);'*

Confirmation of the sites flood zoning; ***The site is located in flood zone 1***

Any detailed maps of historical flood extents at the site and details of any other flood level or flood extent data related to the site that may be relevant, including any photographs or other anecdotal information; ***The site is located in flood zone 1***

Details of any flood defences for the area, their condition and statutory flood defence levels; ***The site is located in flood zone 1***

Easements around the current defences; ***The site is located in flood zone 1***

Details of any known surface water flooding problems in the area and confirmation of any designated critical drainage areas (CDAs); ***Please contact lead local flood authority and local planning authority***

Provision of mapping showing the areas susceptible to surface water flooding and the flood map for surface water (AStSWF and FMfSW); ***Please contact lead local flood authority***

Details of groundwater levels in the vicinity of the site and of the risk of rising groundwater levels and provision of mapping (AStGWF); and ***Please see attached spreadsheets***

Groundwater records at our monitoring boreholes at Alland Grange (250m north) and Plucks Gutter (4900m southwest) indicate the range of levels in the Chalk bedrock underlying the site. Please note the high levels recorded in the wet winters of early 2001 and early 2014.
The nearest reported incident of groundwater flooding in our records is a flooded cellar in High Street, Minster – over 1000m to the southwest.
Mapping indicating the potential risk from groundwater flooding is not available for this area.

An indication of what degree of betterment might be required with regard to surface water runoff management at the site.
Please contact lead local flood authority

Please refer to the Open Government Licence which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

I trust this information is of use. If you have any further questions, please contact us and we will be happy to help.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive: http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

Many thanks
Laura

Laura Buschini
Customers & Engagement Officer
Kent South London & East Sussex

Environment Agency | 0208 4749353 | Jabber 49353| Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH

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Ersum Shahid

From: KSL Enquiries <KSLE@environment-agency.gov.uk>
Sent: 10 August 2017 16:12
To: Ersum Shahid
Cc: KSLPlanning
Subject: [EXT] KSL 56068 UE - FW: 170724/DP13 - Manston Airport, Manston, Ramsgate, CT12 5BQ
Attachments: ThanetHydrometry.pdf; AllandGrange64473001.xlsx; CallisGrange644044002.xlsx; FleeteResvr644043002.xlsx; ManstonGeology.pdf

Dear Ersum,

KSL 56068 UE - Manston Airport, Manston, Ramsgate, CT12 5BQ

Thank you for your request for information that was received on 19 July 2017.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please find our responses to your questions written below in blue.

1. Please advise of any restrictions associated with surface water discharge from the development;

For further information, please submit a pre-application email to our planning team at kslplanning@environment-agency.gov.uk

2. The underlying geology of the site if known;

The underlying geology of the majority of the site is chalk. There may be some anomalies around the boundaries of the site, but we would need to see a site map clearly marked with boundaries in order to clarify this.

3. Any records of flooding of the site or in the area;

We can confirm that we have no record of flooding from rivers and/or the sea for this location, or within a 3km radius. You may wish to check with the Lead Local Flood Authority for this area, Thanet District Council, who hold detailed records for surface water flooding.

4. Any record of groundwater flooding issues;

The Environment Agency only holds the data for flooding that occurs from rivers and/or seas. Please contact Thanet District Council as the Lead Local Flood Authority.

5. Regional groundwater level and flow direction data;

The hydrometric monitoring network maintained by the Environment Agency is shown on the attached map of the Thanet area. This shows that the spatial distribution and density of groundwater level monitoring boreholes (i.e. pink and red squares on the Map) does not allow groundwater flow direction to be triangulated. However, the available data for Alland Grange, Callis Grange and Fleete Reservoir (the three red squares shown on the Map) are provided in Excel format. In addition, relevant extracts from the published Geological Map of the area are also attached. From these, it would appear that groundwater flow under the Manston site will be to the south.

Given the elevated position of the site, groundwater flooding should not be a problem. However, we do have records of flooded cellars in properties in Monckton and Minster. These are associate with the spring line created by the solid strata (Cretaceous Chalk and Palaeocene Thanet Beds) being overlain by impermeable superficial deposits in the Stour valley.

Please refer to the Open Government Licence which explains the permitted use of this information.

I trust this information is of use. If you have any further questions, please contact us and we will be happy to help.

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:
http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

Kind regards,

Ursula

Ursula Evans
Customers and Engagement Officer | Kent, South London and East Sussex
Environment Agency | Orchard House, Endeavour Park, London Road, Addington, ME19 5SH

Internal: 48960 External: 0208 474 6848
Email: ksle@environment-agency.gov.uk
Working pattern: Mon – Friday, 09:00 to 17:00

From: Ersum Shahid [mailto:Ersum.Shahid@rpsgroup.com]
Sent: 19 July 2017 16:36
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Subject: Manston Airport, Manston, Ramsgate, CT12 5BQ

Dear Sir/Madam,

Hope you are well,

RPS has been commissioned to undertake a Surface Water Drainage Strategy to support a planning application for the reopening and redevelopment of Manston Airport at Manston Road, Manston, Ramsgate, CT12 5BQ. The site is centred at OS Grid Reference 618571E 222316N. Please refer to attached Site location plan for reference.

The gross existing site area is approximately 317 hectares brownfield and the Environment Agency flood map indicates that the site is located within Flood Zone 1.

In order for RPS to complete the Surface Water Drainage Strategy, can you please advise as to their requirements for the following:

1. Please advise of any restrictions associated with surface water discharge from the development;
2. The underlying geology of the site if known;
3. Any records of flooding of the site or in the area;
4. Any record of groundwater flooding issues;
5. Regional groundwater level and flow direction data;

Any other details and guidance relevant to undertaking a surface water assessment for this site would be gratefully received.

Please don't hesitate to contact me should you wish to discuss. I look forward to hearing from you.

Kind Regards,
Ersum

Ersum Shahid MEng (Hons)
Consultant (Flood Risk & Drainage Engineer) - RPS Health, Safety and Environment
Unit 12, Waters Edge Business Park, Modwen Road, Salford Quays,
Manchester, M5 3EZ.
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Appendix B

Site Location Plan and Proposed Development Plan

SITE LOCATION

Manston Airport
Manston Road
Manston
Ramsgate
CT12 5BQ

633753E 165797N

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Legend

- Site boundary
- New airfield infrastructure
- Drainage infrastructure
- Museum area
- Existing airfield assets to be retained
- Existing pavement (Potential to breakout & re-use as fill material)
- Proposed ATC tower
- ATC CCTV point

Proposed business development
Existing Radar mast
Proposed spitfire and hurricane memorial museum
Riveroak executive office
Proposed attenuation ponds
Existing Building to be retained
Landscaping
Proposed ATC
Proposed Security Control Point
ATC CCTV point
New Passenger Terminal
Rescue and Fire Fighting Service (RFFS)
Existing private aircraft handling facilities (FBO)
Helicopter Services Facility
General Aviation
Fire Training Ground
Taxiway Alpha
Runway 10/28
Very High Frequency Direction Finder To Be Relocated
Non Directional Beacon
Distance Measuring Equipment
Existing ATC Tower to be Removed
Fuel Farm

Rev	Description	By	Ckd	Date
P05	VHF direction finder note amended	RS	CJ	26.05.17
P04	Notes and Legend Updated	TAW	CJ	11.05.17
P03	Figure Number Added	TAW	CJ	28.04.17
P02	Minor amendments to general arrangement.	CM	CJ	08.03.17
P01	First Issue	BJPF	CJ	20.02.17

RPS
Sherwood House,Sherwood Avenue,
Newark, Nottinghamshire, NG24 1QQ
T:01636 605 700 E: rpsnewark@rpsgroup.com

Client RSP

Project **Manston Airport Masterplan**

Title **Site Layout Plan**

Status	Scale	Date Created
Preliminary	1:7500 @A1	03/06/2016
Project Leader	Drawn By	Checked by
GD	JLE	GD

Document Number	Revision	Suitability
NK018417-RPS-MSE-XX-DR-C-1100	P05	S0

Figure Number 3.5

rpsgroup.com/uk

Appendix C

Topographical Survey

London Manston Airport

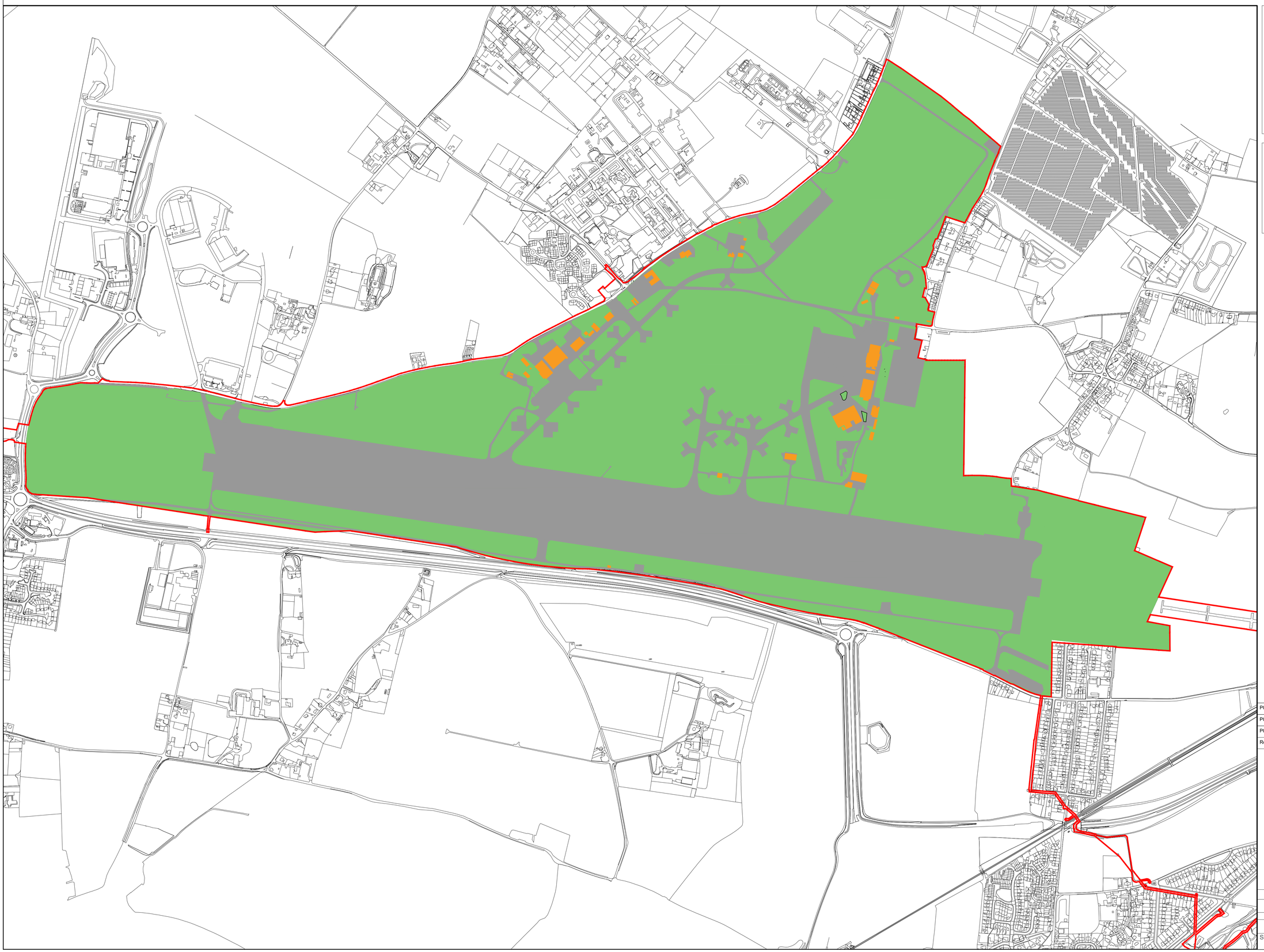
SLC ASSOCIATES Aviation Support Division Broadfields Court Bicester Road Aylesbury Bucks HP19 3BG Tel: 01296 717500 Fax: 01296 717501	Client London Manston Airport PO Box 500 Manston KENT CT21 5BP	Job Title Level Survey	Drawn LAS Levelling All levels are in metres and relate to Mean Sea Level. (Ordnance Datum - Newlyn) Coordinates All coordinates are in metres and are related to National Grid. (UKTM, OSGB36)	Scale 1:2500 Date of Survey July 1999
Rev A: June 1999 by CJW New navigation facilities added			Drawing Number R-99-729-01	Notes

Appendix D

Existing and Proposed Catchment Plan

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER
EXISTING CATCHMENT PLAN
REGULATION 5(2)(o)
THANET DISTRICT COUNCIL

RSP



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Legend:

- Total Site Area (303.186 ha)
- Existing Runway, Taxiways, Roads and Footways (96.252 ha)
- Existing Building Cover (2.663 ha)
- Soft Landscaping (204.271 ha)

Rev	Description	By	Ckd	Apr	Date
P03	Site Boundary Impermeable Area Revised	ST	RR	RR	21.03.18
P02	Site Boundary Revised	ES	RR	RR	23.02.18
P01	Site Layout Revised	ES	RR	RR	08.11.17

Project MANSTON AIRPORT
DEVELOPMENT CONSENT ORDER

Title ENGINEERING DRAWINGS
AND SECTIONS - EXISTING
CATCHMENT PLAN
REGULATION 5(2)(o)
THANET DISTRICT COUNCIL

Document Number	Revision
NK018417 - RPS-B01-01-DR-S-2021	P03

Project Number | Originator - Zone - Level - Type - Role - Drawing Number

Application Number - TR02002

Scale	Sheet Size	Sheet No	Status
NTS	A1	1 of 1	S. 56

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER
ENGINEERING DRAWINGS AND SECTIONS - PROPOSED DRAINAGE CATCHMENT PLAN
REGULATION 5(2)(o)
THANET DISTRICT COUNCIL

ILLUSTRATIVE PURPOSES ONLY

RSP

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2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.

Key:

- Manston Airport Site Area (254.099 ha)
- Airport Related Business Development area (49.087 ha)
- Proposed Runway, Taxiways, Roads, Footways and Business Park Area (133.249 ha)
- Proposed Roads and Footways Business Park Area (13.294 ha)
- Proposed Building Cover (19.884ha)
- Existing Museum Impermeable Area (3.052ha)
- Soft Landscaping (133.701 ha)

Rev	Description	By	Ckd	Apr	Date
P03	Site Boundary and Impermeable Area Revised	ST	RR	RR	21.03.18
P02	Site Boundary Revised	ES	RR	RR	23.02.18
P01	Site Layout Revised	ES	RR	RR	08.11.17

Project MANSTON AIRPORT
DEVELOPMENT CONSENT ORDER

Title PROPOSED CATCHMENT PLAN
REGULATION 5(2)(o)
THANET DISTRICT COUNCIL

Document Number		Revision
NK018417 - RPS-B01-01-DR-S-2022		P03
Project Number	Originator - Zone - Level - Type - Role - Drawing Number	
Application Number - TR02002		

Scale	Sheet Size	Sheet No	Status
NTS	A1	1 of 1	S. 56

Appendix E

Utility Asset Location Plans

SOUTHERN WATER SERVICES LIMITED

LEGEND - MAINS

- Distribution Main / Communication pipe
- Trunk Main
- Raw water main
- Non potable
- Abandoned main
- Proposed Main
- Fire main
- Non SWS
- Sluice valve
- Closed valve
- Air valve
- Butterfly valve
- Pressure reducing valve
- Reflux valve
- Motorised valve
- Clockwise closing valve
- Fire Hydrant
- Washout
- Washout hydrant
- Meter
- Capped end
- Emptying plug
- Stopcock
- Leak Noise Correlator Survey Point
- Anode
- Telemetry cable
- Access point / hatchbox
- Dialysis machine
- Break pressure tank
- Change node
- Pumping station
- Booster station
- Insertion Flow Meter Point
- Water tower
- Service reservoir
- Water Supply Works
- Bore hole / Well
- Intake
- Customer site
- Swab insertion point

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

O.S. Ref.	TR3166SE
Drawn by:	yadavsa
Scale:	1:2500
Date:	03/08/2017
Title:	255213_Manston Airport, Mans-1

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual position of pipes must be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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N

Southern Water

SOUTHERN WATER SERVICES LIMITED

166393

KEY ACCOUNT

Kent International Airport

Rose Farm

Fences Cottages

Air Freight Terminal

SS Sub Sta

FI Sub Sta

Helipad

Wind Sock

Lighting Tower

Lighting Tower

Lighting Tower

Telephone Exchange

Dunstreete

FI Sub Sta

Mast (Telecommunication)

Mill Cottage

Sub Sta

Larkefield

The Mill House

Stone

Thornhill Solar Park

165228

632278

634222

LEGEND - MAINS

- Distribution Main / Communication pipe
- Trunk Main
- RAW Raw water main
- NP Non potable
- Abandoned main
- P P Proposed Main
- FM Fire main
- Non SWS
- Sluice valve
- Closed valve
- AV Air valve
- Butterfly valve
- Pressure reducing valve
- Reflux valve
- MV Motorised valve
- Clockwise closing valve
- Fire Hydrant
- WO Washout
- WOH Washout hydrant
- M Meter
- Capped end
- EP Emptying plug
- Stopcock
- LC Leak Noise Correlator Survey Point
- AN Anode
- TC Telemetry cable
- AP Access point / hatchbox
- D Dialysis machine
- BPT Break pressure tank
- Change node
- Pumping station
- Booster station
- Insertion Flow Meter Point
- Water tower
- Service reservoir
- Water Supply Works
- Bore hole / Well
- Intake
- Customer site
- Swab insertion point

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

O.S. Ref. TR3365NW	Drawn by:	yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual position of pipes must be determined on site.
	Scale:	1:2500	
	Date:	03/08/2017	WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
Title: 255213_Manston Airport, Mans-2			Based upon Ordnance Survey Digital Data with the permission of the Controller of H.M.S.O. Crown Copyright Reserved Licence No. WU298530

N

Southern Water

SOUTHERN WATER SERVICES LIMITED

LEGEND - MAINS

Symbol	Description
	Distribution Main / Communication pipe
	Trunk Main
RAW	Raw water main
NP	Non potable
	Abandoned main
P	Proposed Main
FM	Fire main
	Non SWS
	Sluice valve
	Closed valve
AV	Air valve
	Butterfly valve
	Pressure reducing valve
	Reflux valve
mv	Motorised valve
	Clockwise closing valve
	Fire Hydrant
WO	Washout
WOH	Washout hydrant
M	Meter
	Capped end
EP	Emptying plug
	Stopcock
SP	Leak Noise Correlator Survey Point
AN	Anode
TC	Telemetry cable
AP	Access point / hatchbox
D	Dialysis machine
BPT	Break pressure tank
	Change node
	Pumping station
	Booster station
	Insertion Flow Meter Point
	Water tower
	Service reservoir
	Water Supply Works
	Bore hole / Well
	Intake
	Customer site
	Swab insertion point

MATERIALS

Material	Code
Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

O.S. Ref. TR3465NE	Drawn by: yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual position of pipes must be determined on site.
	Scale: 1:2500	WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
	Date: 03/08/2017	
Title: 255213_Manston Airport, Mans-3		Based upon Ordnance Survey Digital Data with the permission of the Controller of H.M.S.O. Crown Copyright Reserved Licence No. WU298530

N

Southern Water

SOUTHERN WATER SERVICES LIMITED

167281

166115

633022

634966

LEGEND - MAINS

Distribution Main / Communication pipe	Clockwise closing valve	Dialysis machine
Trunk Main	Fire Hydrant	Break pressure tank
Raw water main	Washout	Change node
Non potable	Washout hydrant	Pumping station
Abandoned main	Meter	Booster station
Proposed Main	Capped end	Insertion Flow Meter Point
Fire main	Emptying plug	Water tower
Non SWS	Stopcock	Service reservoir
Sluice valve	Leak Noise Correlator Survey Point	Water Supply Works
Closed valve	Anode	Bore hole / Well
Air valve	Telemetry cable	Intake
Butterfly valve	Access point / hatchbox	Customer site
Pressure reducing valve		Swab insertion point
Reflux valve		
Motorised valve		

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

O.S. Ref. TR3366NE	Drawn by: yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual position of pipes must be determined on site.
	Scale: 1:2500	WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
	Date: 03/08/2017	
Title: 255213_Manston Airport, Mans-4		Based upon Ordnance Survey Digital Data with the permission of the Controller of H.M.S.O. Crown Copyright Reserved Licence No. WU298530

N

Southern Water

SOUTHERN WATER SERVICES LIMITED

167794

166629 633221 635165

LEGEND - MAINS

Distribution Main / Communication pipe
Trunk Main
Raw water main
Non potable
Abandoned main
Proposed Main
Fire main
Non SWS
Sluice valve
Closed valve
Air valve
Butterfly valve
Pressure reducing valve
Reflux valve
Motorised valve
Clockwise closing valve
Fire Hydrant
Washout
Washout hydrant
Meter
Capped end
Emptying plug
Stopcock
Leak Noise Correlator Survey Point
Anode
Telemetry cable
Access point / hatchbox
Dialysis machine
Break pressure tank
Change node
Pumping station
Booster station
Insertion Flow Meter Point
Water tower
Service reservoir
Water Supply Works
Bore hole / Well
Intake
Customer site
Swab insertion point

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

O.S. Ref.	TR3467SW
Drawn by:	yadavsa
Scale:	1:2500
Date:	03/08/2017
Title:	255213_Manston Airport, Mans-5

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual position of pipes must be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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N

Southern Water

SOUTHERN WATER SERVICES LIMITED

167794

166629

633221

635165

LEGEND - MAINS

Distribution Main / Communication pipe	
Trunk Main	
RAW	Raw water main
NP	Non potable
	Abandoned main
P P	Proposed Main
FM	Fire main
	Non SWS
	Sluice valve
	Closed valve
AV	Air valve
	Butterfly valve
	Pressure reducing valve
	Reflux valve
	Motorised valve
	Clockwise closing valve
	Fire Hydrant
WO	Washout
WOH	Washout hydrant
M	Meter
	Capped end
EP	Emptying plug
	Stopcock
LNCS	Leak Noise Correlator Survey Point
AP	Anode
TC	Telemetry cable
AP	Access point / hatchbox
D	Dialysis machine
BP	Break pressure tank
	Change node
	Pumpling station
	Booster station
	Insertion Flow Meter Point
	Water tower
	Service reservoir
	Water Supply Works
	Bore hole / Well
	Intake
	Customer site
	Swab insertion point

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

O.S. Ref. TR3467SW	Drawn by: yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual position of pipes must be determined on site.	N
	Scale: 1:2500		
	Date: 03/08/2017	WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement	
Title: 255213_Manston Airport, Mans-6		Based upon Ordnance Survey Digital Data with the permission of the Controller of H.M.S.O. Crown Copyright Reserved Licence No. WU298530	Southern Water

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0202X		30.51	225	UNK	CIRC						
0301X			225	UNK	CIRC						
0301X		33.83	225	UNK	CIRC						
0302X		33.22	150	VC	CIRC						
0303X		35.96	150	VC	CIRC						
0304X		35.95	150	VC	CIRC						
0401X		39.95	225	UNK	CIRC						
0402X		39.62	225	UNK	CIRC						
0403X		38.69	225	UNK	CIRC						
0404X		38.19	225	UNK	CIRC						
0405X		37.76	150	VC	CIRC						
0501X		42.82	225	UNK	CIRC						
0502X			100	UNK	CIRC						
0601X		47.11	45.4	150	VC	CIRC					
0601X		31.82	28.63	150	VC	CIRC					
0602X		45.14	43.97	150	VC	CIRC					
0700X				UNK	CIRC						
0801X		37	35.96	150	VC	CIRC					
1201X			32.15	150	VC	CIRC					
1304X		34.95		150	VC	CIRC					
1303X		37.59	35.62	150	VC	CIRC					
1401X				UNK	CIRC						
1402X		38.36	37.47	150	VC	CIRC					
1404X		41.67	40.91	150	VC	CIRC					
1405X		40.1	38.3	150	VC	CIRC					
1406X		41.18	37.84	150	VC	CIRC					
1408X		39.3	37.46	100	VC	CIRC					
1410X				150	VC	CIRC					
2201X				UNK	CIRC						
2202X		34.89		150	VC	CIRC					
2302X		35.93	34.15	150	VC	CIRC					
2303X		35.45		150	VC	CIRC					
2401X		40.34	37.32	150	VC	CIRC					
2402X				150	VC	CIRC					
2801X				UNK	CIRC						
2802X				150	VC	CIRC					
3501X				UNK	CIRC						
3801X				UNK	CIRC						
3802X				150	VC	CIRC					
4801X				UNK	CIRC						
4802X				UNK	CIRC						
5001X				UNK	CIRC						
5002X				UNK	CIRC						
5501X				UNK	CIRC						
5502X				UNK	CIRC						
6001X				UNK	CIRC						
6104X				UNK	CIRC						
6900X				UNK	CIRC						
7701X		32.78	31.7	150	VC	CIRC					
8200X				225	CIRC						
8201X				UNK	CIRC						
8202X		33.365	32.025	225	CIRC						
9501X				UNK	CIRC						
9502X				UNK	CIRC						
9503X				UNK	CIRC						
9504X				UNK	CIRC						
9505X				UNK	CIRC						
9506X				UNK	CIRC						
9507X				UNK	CIRC						
9508X				UNK	CIRC						
9509X				UNK	CIRC						
9510X				UNK	CIRC						
9511X				UNK	CIRC						
9512X				UNK	CIRC						
9513X				UNK	CIRC						
9514X				UNK	CIRC						
9515X				UNK	CIRC						
9516X				UNK	CIRC						
9517X				UNK	CIRC						
9518X				UNK	CIRC						
9519X				UNK	CIRC						
9520X				UNK	CIRC						
9521X				UNK	CIRC						
9522X				UNK	CIRC						
9523X				UNK	CIRC						
9524X				UNK	CIRC						
9525X				UNK	CIRC						
9526X				UNK	CIRC						
9527X				UNK	CIRC						
9528X				UNK	CIRC						
9529X				UNK	CIRC						
9530X				UNK	CIRC						
9531X				UNK	CIRC						
9532X				UNK	CIRC						
9533X				UNK	CIRC						
9534X				UNK	CIRC						
9535X				UNK	CIRC						
9536X				UNK	CIRC						
9537X				UNK	CIRC						
9538X				UNK	CIRC						
9539X				UNK	CIRC						
9540X				UNK	CIRC						
9541X				UNK	CIRC						
9542X				UNK	CIRC						
9543X				UNK	CIRC						
9544X				UNK	CIRC						
9545X				UNK	CIRC						
9546X				UNK	CIRC						
9547X				UNK	CIRC						
9548X				UNK	CIRC						
9549X				UNK	CIRC						
9550X				UNK	CIRC						
9551X				UNK	CIRC						
9552X				UNK	CIRC						
9553X				UNK	CIRC						
9554X				UNK	CIRC						
9555X				UNK	CIRC						
9556X				UNK	CIRC						
9557X				UNK	CIRC						
9558X				UNK	CIRC						
9559X				UNK	CIRC						
9560X				UNK	CIRC						
9561X				UNK	CIRC						
9562X				UNK	CIRC						
9563X				UNK	CIRC						
9564X				UNK	CIRC						
9565X				UNK	CIRC						
9566X				UNK	CIRC						
9567X				UNK	CIRC						
9568X				UNK	CIRC						
9569X				UNK	CIRC						
9570X				UNK	CIRC						
9571X				UNK	CIRC						
9572X				UNK	CIRC						
9573X				UNK	CIRC						
9574X				UNK	CIRC						
9575X				UNK	CIRC						
9576X				UNK	CIRC						
9577X				UNK	CIRC						
9578X				UNK	CIRC						
9579X				UNK	CIRC						
9580X				UNK	CIRC						
9581X				UNK	CIRC						
9582X				UNK	CIRC						
9583X				UNK	CIRC						
9584X				UNK	CIRC						
9585X				UNK	CIRC						
9586X				UNK	CIRC						
9587X				UNK	CIRC						
9588X				UNK	CIRC						
9589X				UNK	CIRC						
9590X				UNK	CIRC						
9591X				UNK	CIRC						
9592X				UNK	CIRC						
9593X				UNK	CIRC						
9594X				UNK	CIRC						
9595X				UNK	CIRC						
9596X				UNK	CIRC						
9597X				UNK	CIRC						
9598X				UNK	CIRC						
9599X				UNK	CIRC						
9600X				UNK	CIRC						
9601X		35.687	33.627	UNK	CIRC						
9602X		33.916	32.385	225	CIRC						
9901X				VC	CIRC						
9902X				VC	CIRC						

* *

* *

LINE STYLES / COLOURS

Brown — Foul
— 1" — Foul Gravity Sewer
Foul Rising Main
Foul Rising Main
Combined
Combined Sytem Sewer
Combined Rising Main
Combined Rising Main
Red — Building Over Agreement Area
Dark Blue — Thetaq Effluent
Purple — Sludge
Sewer Catchment
Sewer Pipe Joined
Light Blue — Surface Water
Surface Water Rising Main
Private
Access Shaft
Air Accumulator
Green — Other
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

MATERIALS

AC Asphalt
ASC Asphalt w Bonded Asbestos Cement
BRC Brick (Commercial)
BRE Brick (Engineering)
CO Concrete Box Culvert
CI Cast Iron
CO Concrete (In-Situ)
CP Concrete (Pre-Cast)
CSU Concrete (Unknown)
CSB Concrete Segmental (unlined)
DI Ductile Iron
GRC Glass Reinforced Concrete
MAC Masonry in Concrete
MAS Masonry in Mortar Courses
MAR Masonry in random Courses
PE Polyethylene
PP Polypropylene
PVC Polyvinyl Chloride
RPM Reinforced Plastic Matrix
S Steel
ST Stoneware
VC Vitrified Clay
XXX Other
ZZZ Unknown

LEGEND - SEWERS

Other (V)
Other
Change in sewer (V)
Change in sewer
Flap Valve
Cascade
Hatch box
Valve
Closed Valve
Air Valve
Hatch box (FAC)
Direction arrow
Emptying valve
Catchpit
Soakaway
Inlet
Balancing Pond
Wastewater treatment works
Septic tank
Manhole treatment works
Cesspit
Gully with hazelknock
Vent
Vent column
Tidal storage tank
Tidal
Head of Public Sewer
Mitre
Mitre Pumping Station

SHAPES (S)

Arched
Barrel
Circular
Egg
Horseshoe
Rectangular
Square
Trapezoidal
U Shape
Other

NODE REFERENCING SYSTEM

1st digit: Inspection Chamber
2nd digit: Inverted invert marks existing chamber
3rd digit: Sub-Catchment
4th digit: Unique number
Unknown

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

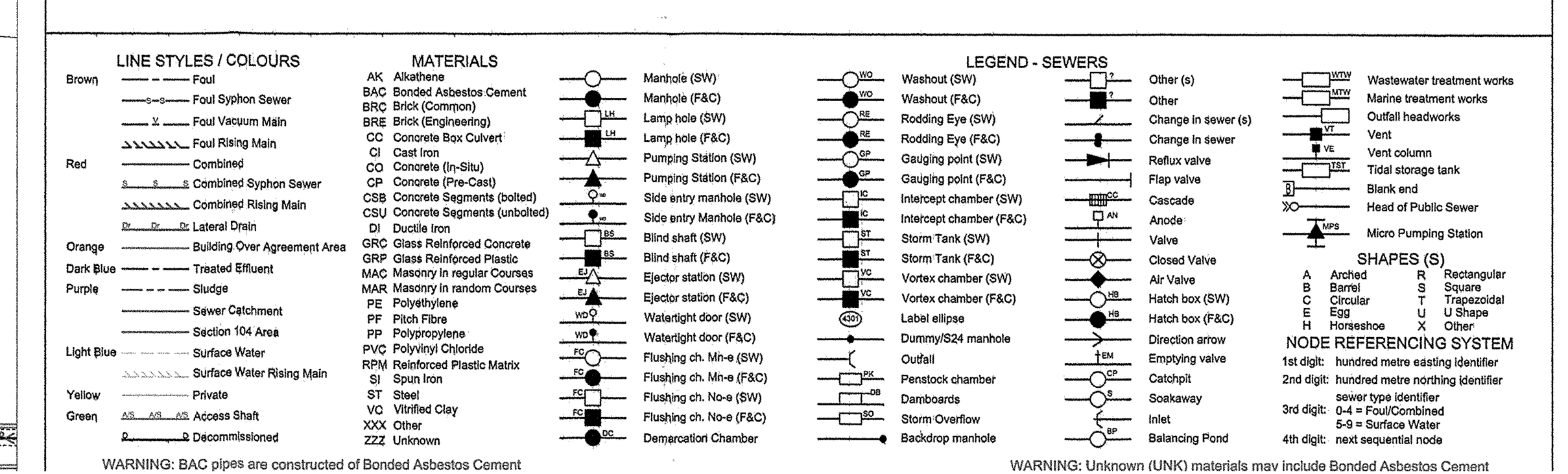
Manhole (SW)
Manhole (FAC)
Lamp hole (SW)
Lamp hole (FAC)
Pumping Station (SW)
Pumping Station (FAC)
Side entry Manhole (SW)
Side entry Manhole (FAC)
Blind shaft (SW)
Blind shaft (FAC)
Ejector station (SW)
Ejector station (FAC)
Washout (SW)
Washout (FAC)
Rodding Eye (SW)
Rodding Eye (FAC)
Grappling point (SW)
Grappling point (FAC)
Interceptor chamber (SW)
Interceptor chamber (FAC)
Storm Tank (SW)
Storm Tank (FAC)
Vortex chamber (SW)
Vortex chamber (FAC)
Lamp edge
Dummy/Blind manhole
Orifice
Penstock chamber
Overflow
Storm Overflow
Bleedstop manhole

166866

Node	Cover	Invert	Size	Material	Shape	
010DX			150	UNK	CIRC	
0301X			225	UNK	CIRC	*
0301X			150	UNK	CIRC	*
0502X			100	UNK	CIRC	
050DX			100	UNK	CIRC	
060DX			UNK	UNK	CIRC	
070DX			UNK	UNK	CIRC	
0801X			225	UNK	CIRC	
130DX			UNK	UNK	CIRC	
1701X			UNK	UNK	CIRC	
1702X			225	UNK	CIRC	
2501X			UNK	UNK	CIRC	
2502X			225	UNK	CIRC	
2601X	47.23	45.68	300	UNK	CIRC	
260DX			150	UNK	CIRC	
3101X	39.6	36.5	300	UNK	CIRC	
3601X	47.92	44.13	300	UNK	CIRC	
3701X	47.71	44.51	300	UNK	CIRC	
4101X	38.5	36.08	375	UNK	CIRC	
4102X			UNK	VC	CIRC	
410DX			300	UNK	CIRC	
4301X	47.7	43.22	300	UNK	CIRC	
430AX	48.642	46.295	800	DI	CIRC	
431AX	48.642	46.295	800	DI	CIRC	
4401X	48.41	43.57	300	UNK	CIRC	
4501X	48.26	43.87	300	UNK	CIRC	
450DX			UNK	UNK	CIRC	
4601X	48.12	44.11	300	UNK	CIRC	
5001X	35.02	33.32	225	UNK	CIRC	
5002X	37.9	34.96	375	UNK	CIRC	
5003X	38.07	35.84	375	UNK	CIRC	
5004X			UNK	UNK	CIRC	
500DX			375	UNK	CIRC	
5201X	46.95	43.05	300	UNK	CIRC	
5301X	46.82	43.09	300	UNK	CIRC	
5302X	46.89	43.14	300	UNK	CIRC	
5901X	47.73	45	150	UNK	CIRC	*
5901X	30.39	28.17	225	UNK	CIRC	*
5902X	47.44	44.52	150	UNK	CIRC	
5903X	47.31	44.06	150	UNK	CIRC	
5904X			150	UNK	CIRC	
590DX			225	UNK	CIRC	
6001X	38.56		600	UNK	CIRC	
6002X	38.4	33.19	525	UNK	CIRC	
6003X	38.2		375	UNK	CIRC	
6004X			UNK	UNK	CIRC	
600DX			225	UNK	CIRC	
6101X	42.58	39.93	225	UNK	CIRC	*
6101X	48.25	42.67	400	UNK	CIRC	*
6102X			UNK	UNK	CIRC	
6103X			UNK	UNK	CIRC	
6201X	47.23	42.88	300	UNK	CIRC	*
6201X	47.56	45.31	225	UNK	CIRC	*
6901Y	34.23	31.93	525	UNK	CIRC	*
6901X	47.26	43.64	150	UNK	CIRC	*
6902Y	49.96	43.41	600	UNK	CIRC	
6903X	47.46	41.77	600	UNK	CIRC	
7001X	47.19	42.24	600	UNK	CIRC	*
7001X	39.22		600	UNK	CIRC	*
7002X	36.3	34.98	150	UNK	CIRC	
700DX			600	UNK	CIRC	
7101X	48.09	45.54	300	UNK	CIRC	*
7101X	42.9	40.49	225	UNK	CIRC	*
7102X	47.88		600	UNK	CIRC	*
7102X	42.23	40.42	225	UNK	CIRC	*
7103X	47.9	42.55	400	UNK	CIRC	
7201X	47.53	44.23	375	UNK	CIRC	*
7201X	46.63	44.33	225	UNK	CIRC	*
7202X	47.7	45.77	225	UNK	CIRC	
770DX			225	VC	CIRC	
7801X	48.15	41.55	600	UNK	CIRC	
7802X	48.68	41.36	600	UNK	CIRC	
7803X	49.33	41.19	600	UNK	CIRC	
8105X	48.31		300	UNK	CIRC	
8201X	48.1	44.45	375	UNK	CIRC	
820DX			UNK	UNK	CIRC	
9501X			UNK	UNK	CIRC	
9502X			UNK	UNK	CIRC	
9503X			UNK	UNK	CIRC	
9504X			UNK	UNK	EGG	
9505X			150	UNK	CIRC	
9506X			100	UNK	CIRC	
9507X			UNK	UNK	CIRC	
9508X			100	UNK	CIRC	
9509X			UNK	UNK	CIRC	
950DX			UNK	UNK	CIRC	
953DX			150	UNK	CIRC	
954DX			UNK	UNK	CIRC	
95ADX			UNK	UNK	CIRC	
95BDX			150	UNK	CIRC	
95CDX			150	UNK	CIRC	
95DDX			150	UNK	CIRC	
95EDX			150	UNK	CIRC	
95FDX			UNK	UNK	CIRC	
95GDX			UNK	UNK	CIRC	
9601X			150	VC	CIRC	
9602X			150	VC	CIRC	
9603X			150	VC	CIRC	
9604X			150	VC	CIRC	
9605X			150	UNK	CIRC	
9606X			150	UNK	CIRC	
962DX			150	UNK	CIRC	

Node	Cover	Invert	Size	Material	Shape

Node	Cover	Invert	Size	Material	Shape



Node	Cover	Invert	Size	Material	Shape
0001X	50.78	48.94	300	UNK	CIRC
0001X	53.95	29.73	300	UNK	CIRC
0001X	39.17	34.37	600	UNK	CIRC
0001X	34.03		600	UNK	CIRC
0101X	48.24	46.96	225	UNK	CIRC
0101X	41.12	34.82	600	UNK	CIRC
0101X	36.22	33.44	225	UNK	CIRC
0201X	44.4	38.32	600	UNK	CIRC
0201X	46.88	38.28	450	UNK	CIRC
0202X	50.18		300	UNK	CIRC
0202X	39.43	35.79	225	UNK	CIRC
0202X	36.62	33.74	225	UNK	CIRC
0202X	40.86	36.42	225	UNK	CIRC
0204X			UNK	UNK	CIRC
0205X	52.25	50.85	150	UNK	CIRC
0301X	44.55	43.16	150	UNK	CIRC
0302X	44.2	41.44	UNK	UNK	CIRC
0302X	52.06		225	UNK	CIRC
0303X	50.91	49.56	225	UNK	CIRC
0303X	50.79	49.34	225	UNK	CIRC
0304X	50.64	49.3	225	UNK	CIRC
0305X	50.17	48.72	225	UNK	CIRC
0401X	52.78	47.73	300	UNK	CIRC
0402X	52.88	47.74	300	UNK	CIRC
0402X	51.49	50.54	300	UNK	CIRC
0403X	51.22	49.82	300	UNK	CIRC
0405X	51.22		300	UNK	CIRC
0407X	46.02	45.365	300	VC	CIRC
0501X	51.1	40.9	225	VC	CIRC
0502X	51.25	49.2	225	VC	CIRC
0503X	51.710	41.244	300	VC	CIRC
0601X	46.25	44.715	100	VC	CIRC
0602X	46.25	45.18	100	VC	CIRC
0603X	46.15	44.715	150	VC	CIRC
0604X	46.24	44.725	150	VC	CIRC
090AX	51.33	28.98	800	DI	CIRC
090AX	52.507	48.868	800	DI	CIRC
1001X	46.68	45.228	225	UNK	CIRC
1001X	46.68	45.237	225	UNK	CIRC
1001X	32.63	29.37	300	UNK	CIRC
1002X	48.63		225	UNK	CIRC
1003X	49.24	43.89	300	UNK	CIRC
1003X	31.96	30.68	225	UNK	CIRC
1004X	31.28	29.01	750	UNK	CIRC
1006X	30.96	29.51	225	UNK	CIRC
1007X			UNK	UNK	CIRC
1010X			300	UNK	CIRC
1101X	47.517	45.467	225	UNK	CIRC
1101X	39.64	35.87	225	UNK	CIRC
1102X	38.84	35.29	225	UNK	CIRC
1103X	50.914	40.887	300	VC	CIRC
1104X	50.155	47.455	300	VC	CIRC
1401X	45.25	41.9	225	VC	CIRC
1602X	45.9	42.74	150	VC	CIRC
1604X	46.2	42.28	225	VC	CIRC
1701X	46.58	42.45	225	VC	CIRC
1702X	48.24	47.401	150	VC	CIRC
1703X	48.163	47.281	150	VC	CIRC
2209X	48.139	47.175	150	VC	CIRC
2209X			450	UNK	CIRC
2301X	44.76	42.96	225	UNK	CIRC
2302X	48.84	47.44	225	UNK	CIRC
2302X	48.87	47.12	225	UNK	CIRC
2303X	44.39	42.31	225	UNK	CIRC
2303X	44.76	43.92	150	UNK	CIRC
2304X	48.82	47.37	225	UNK	CIRC
2305X	48.89	47.87	225	UNK	CIRC
2306X	49.06	47.56	225	UNK	CIRC
2307X	49.11		150	VC	CIRC
2310X			160	UNK	CIRC
2401X	49.1		900	UNK	CIRC
2402X	49.06		225	UNK	CIRC
2403X	49.16	47.43	300	UNK	CIRC
2404X			UNK	UNK	CIRC
2501X	49.77		150	UNK	CIRC
2601X	44.13	42.78	150	UNK	CIRC
2602X	44.43	42.98	150	UNK	CIRC
2603X	43.98	42.3	150	UNK	CIRC
2604Y	43.78	39.13	300	UNK	CIRC
2604X	44.76	43.32	150	UNK	CIRC
2701X	44.76	43.92	150	VC	CIRC
2702X	44.41	43.66	150	UNK	CIRC
2703X	44.25	43.45	150	UNK	CIRC
2801X	44.08	43.24	150	UNK	CIRC
2802X	43.77	41.73	300	UNK	CIRC
2804X			UNK	VC	CIRC
2805X			UNK	UNK	CIRC
2806X			UNK	UNK	CIRC
2901X	45.4	43.8	300	UNK	CIRC
2901X	30.28	27.83	750	UNK	CIRC
2902X	43.48	42.43	225	UNK	CIRC
2903X	43.62	42.37	225	UNK	CIRC
2904X	45.19	43.77	300	UNK	CIRC
2905X	44.71	42.71	225	UNK	CIRC
2906X	44.77	42.47	225	UNK	CIRC
3000X	31.88		450	UNK	CIRC
3001X	45.17	43.12	300	UNK	CIRC
3002X	45.93	43.81	225	UNK	CIRC
3004X	45.27	43.67	225	UNK	CIRC
3005X	46.54	44.54	225	UNK	CIRC
3006X	46.41	44.31	225	UNK	CIRC
3008X			225	UNK	CIRC
3101X	39.6	36.5	300	UNK	CIRC
3101X	35.84	34.74	360	UNK	CIRC
3102X	34.44	31.67	300	UNK	CIRC
3102X	47.19	45.04	225	UNK	CIRC
3103X	47.52	45.62	150	UNK	CIRC
3106X	47.11		225	VC	CIRC
3107X	47.666	46.298	150	UNK	CIRC
3108X	47.869	46.668	150	VC	CIRC

Node	Cover	Invert	Size	Material	Shape
3109X	47.865	46.515	150	VC	CIRC
3110X	47.834	46.444	150	VC	CIRC
3201X	41.32	37.77	225	UNK	CIRC
3202X	48.22		225	UNK	CIRC
3203X	48.61	46.76	225	UNK	CIRC
3204X	48.58	37.75	900	UNK	CIRC
3205X			UNK	UNK	CIRC
3206X			UNK	UNK	CIRC
3207X			UNK	UNK	CIRC
3208X			UNK	UNK	CIRC
3209X	49.22	47.72	225	UNK	CIRC
3301X	43.85	42.15	225	UNK	CIRC
3302X	43.41		225	UNK	CIRC
3302X	49.24	47.69	225	UNK	CIRC
3303X	49.24	47.64	225	UNK	CIRC
3303X	43.54	40.49	225	UNK	CIRC
3304X			UNK	VC	CIRC
3305X	49.04	46.94	UNK	UNK	CIRC
3305X	48.72	47.12	225	UNK	CIRC
3306X			UNK	UNK	CIRC
3307X			UNK	UNK	CIRC
3310X			UNK	UNK	CIRC
3401X	48.72	47.32	900	UNK	CIRC
3402X	48.63	46.23	900	UNK	CIRC
3403X			100	VC	CIRC
3404X			100	VC	CIRC
3405X			100	UNK	CIRC
3501X	49.25		UNK	UNK	CIRC
3505X	48.819	47.015	225	UNK	CIRC
3601X	26.56	25.17	150	UNK	CIRC
3602X	24.91	23.37	150	UNK	CIRC
3603X	24.91	23.37	150	UNK	CIRC
3604X	23.17	21.86	150	UNK	CIRC
3605X			225	UNK	CIRC
3701X	43.26	39.46	150	UNK	CIRC
3703X			UNK	UNK	CIRC
3705X			UNK	UNK	CIRC
3706X			UNK	UNK	CIRC
3707X			UNK	UNK	CIRC
3801X	43.37	41.19	900	UNK	CIRC
3803X	43.43	34.9	900	UNK	CIRC
3805X	43.43		UNK	UNK	CIRC
3806X			900	UNK	CIRC
3807X	45.63	43.58	225	UNK	CIRC
3901X	29.21	27.57	225	UNK	CIRC
3902X	44.35	42.15	225	UNK	CIRC
3902X	29.28		225	UNK	CIRC
3903X	27.97	26.7	750	UNK	CIRC
3904X	44.11	41.91	225	UNK	CIRC
3905X	44.21	42.11	225	UNK	CIRC
3906X	44.21	42.11	225	UNK	CIRC
3907X	44.37	43.02	225	UNK	CIRC
3908X	44.28	42.88	225	UNK	CIRC
3909X			UNK	UNK	CIRC
3910X			UNK	UNK	CIRC
4101X	38.5	36.08	375	UNK	CIRC
4102X			UNK	UNK	CIRC
4103X			100	VC	CIRC
4301X	47.7	43.22	300	UNK	CIRC
4308X	48.640	46.205	800	DI	CIRC
4309X	48.641	46.206	800	DI	CIRC
4401X	48.41	43.57	300	UNK	CIRC
4501X	48.26	43.57	300	UNK	CIRC
4502X	48.26	43.37	225	UNK	CIRC
5002X	37.9	34.96	375	UNK	CIRC
5003X	38.07	35.84	375	UNK	CIRC
5004X			UNK	UNK	CIRC
5005X			375	UNK	CIRC
5201X	46.95	43.05	300	UNK	CIRC
5301X	46.82	43.09	300	UNK	CIRC
5302X	50.62	46.95	150	UNK	CIRC
5502X	46.69	43.14	300	UNK	CIRC
5701X	24.11	22.85	150	UNK	CIRC
5702X	24.11		375	UNK	CIRC
5703X	23.03	21.61	375	UNK	CIRC
5801X	25.85	23.9	300	UNK	CIRC
5901X	47.73	44.17	225	UNK	CIRC
5902X	47.44	44.52	150	UNK	CIRC
5903X	47.31	44.06	150	UNK	CIRC
5904X			UNK	UNK	CIRC
5905X			UNK	UNK	CIRC
6001X	38.56	33.19	525	UNK	CIRC
6002X	38.4		525	UNK	CIRC
6003X	38.2		525	UNK	CIRC
6004X			UNK	UNK	CIRC
6005X			225	UNK	CIRC
6101X	48.28	39.87	225	UNK	CIRC
6102X	48.29	39.97	225	UNK	CIRC
6103X	35.41	31.79	750	UNK	CIRC
6104X			UNK	UNK	CIRC
6105X			UNK	UNK	CIRC
6106X	36.64	31.04	600	UNK	CIRC
6201X	47.23	42.88	300	UNK	CIRC
6202X	47.56	45.31	225	UNK	CIRC
6301X	52.84	43.77	150	UNK	CIRC
6302X	51.45	44.15	150	UNK	CIRC
6401X	52.84	43.77	150	UNK	CIRC
6602X	21.75	13.67	450	UNK	CIRC
6603X	20.88		225	UNK	CIRC
6604X	18.24		225	UNK	CIRC
6605X	22.41		450	UNK	CIRC
6702X	21.554		450	UNK	CIRC
6705Y	21.59		225	UNK	CIRC
6801X	26.89	23.2	525	UNK	CIRC
6802X			100	VC	CIRC
6803X			525	UNK	CIRC
6901X	47.26	43.64	150	UNK	CIRC
6902X	47.46	43.84	150	UNK	CIRC
6903X	47.46		600	UNK	CIRC
7001X	47.19	42.24	600	UNK	CIRC
7002X	36.3	34.98	150	UNK	CIRC
7003X			900	UNK	CIRC
7004X			900	UNK	CIRC
7101X	37.02	30.61	900	UNK	CIRC
7101X	53.58	44.88	300	UNK	CIRC
7101X	48.09	45.54	300	UNK	CIRC
7101X	48.43	40.48	225	UNK	CIRC
7101X	42.9	40.42	600	UNK	CIRC
7102X	47.88		600	UNK	CIRC
7103X	47.9	42.55	400	UNK	CIRC
7201X	47.63	44.23	375	UNK	CIRC
7202X	47.7	45.77	225	UNK	CIRC
7401X	54.7	43.28	150	UNK	CIRC
7402X	54.42	54.28	150	UNK	CIRC
7404X	55.35	54.42	150	UNK	CIRC
7405X	55.89	54.88	150	UNK	CIRC
7701X	52.43	51.33	150	UNK	CIRC
7801X	48.15	41.55	600	UNK	CIRC
7802X	48.68	41.38	600	UNK	CIRC
8001X	39.22	33.91	600	UNK	CIRC
8001X	37.2	30.15	750	VC	CIRC
8002X	36.925	35.165	150	VC	CIRC
8101X	48.81	47.28	150	UNK	CIRC
8101X	37.41	34.71	375	UNK	CIRC
8102X	48.98	47	150	UNK	CIRC
8103X	36.665	33.595	UNK	UNK	CIRC
8104X	48.85	46.51	300	UNK	CIRC
8105X	48.31	35.61	300	VC	CIRC
8106X	48.366	47.516	150	VC	CIRC
8107X	49.36	47.18	150	VC	CIRC
8201X	48.1	44.45	375	UNK	CIRC
8202X	56.82	37.54	300	UNK	CIRC
8203X	56.92	56.82	150	UNK	CIRC
8301X	57.2		150	UNK	CIRC
8302X	56.58	56.04	150	UNK	CIRC
8303X	56.05	54.96	150	UNK	CIRC
8304X	56.42		150	UNK	CIRC
8401X	55.6	42.75	150	UNK	CIRC
8402X	56.2		150	UNK	CIRC
8403X	55.42	55.42	150	UNK	CIRC
8404X	54.65	53.59	150	UNK	CIRC
8405X	55.18	42.53	150	UNK	CIRC
8701X	49.7	41.02	600	UNK	CIRC

Node	Cover	Invert	Size	Material	Shape
9001X	39.25	34.21	600	UNK	CIRC
9001X	49.79	47.87	300	UNK	CIRC
9001X	36.26	31.94	225	UNK	CIRC
9002X	36.43	29.74	750	UNK	CIRC
9003X	35.77	29.56	750	UNK	CIRC
9004X	35.4		750	UNK	CIRC
9100X	48.55	33.743	225	VC	CIRC
9101X	49.42	47	225	UNK	CIRC
9101Z	37.98	33.75	225	UNK	CIRC
9102X	50.23	49.74	225	UNK	CIRC
9102Z	36.32	32.57	225	UNK	CIRC
9103X	49.17	47.26	225	UNK	CIRC
9201X	47.54	45.74	300	UNK	CIRC
9201Z	40.39	37.765	150	UNK	CIRC
9202X	46.99	45.54	375	UNK	CIRC
9202Z	39.465	36.225	UNK	UNK	CIRC
9203Z	39.99	35.46	225	UNK	CIRC
9204X	37.594	34.134	UNK	UNK	CIRC
9301X	45.97	39.57	600	UNK	CIRC
9301Y	43.66	38.61	150	UNK	CIRC
9301Y	41.86	38.61	150	UNK	CIRC
9302X	53.49	51.8	225	UNK	CIRC
9303X	53.05	51.29	225	UNK	CIRC
9304X	52.13	50.63	300	UNK	CIRC
9305X	52.09	50.12	300	UNK	CIRC
930WX	45.66	43.087	800	DI	CIRC
9401X	51.48	46.87	300	UNK	CIRC
9401X	53.24	51.34	225	UNK	CIRC
9402X	50.5	46.85	225	UNK	CIRC
9501X	43.72	40.21	600	UNK	CIRC
9501X	52.14	41.67	300	UNK	CIRC
9502X	50.71	47.04	225	UNK	CIRC
9503X	52.64		225	UNK	CIRC
9800X	52.643	41.58	600	VC	CIRC
9801X	47.65	40.76	150	VC	CIRC
9802X	44.31	40.42	600	UNK	CIRC

LINE STYLES / COLOURS

Brown	———	Foul Syphon Sewer
	———	Foul Rising Main
	———	X ——— Foul Nelson Main
Red	———	Foul Rising Main
	———	Foul Box Culvert
	———	Combined Syphon Sewer
	———	Combined Rising Main
Orange	———	Building Over Agreement Area
Dark Blue	———	Syphon Effluent
Purple	———	Sewer Catchment
	———	Section 104 Area
Light Blue	———	Surface Water
	———	Surface Water Rising Main
Yellow	———	Spot Iron
Green	———	Stream
	———	Decommissioned

MATERIALS

AC	Asbestos Cement
BAC	Bonded Asbestos Cement
BRS	Brass
BRE	Brick (Engineering)
CI	Cast Iron
CO	Concrete Box Culvert
CP	Concrete (Pre-Cast)
CSS	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAS	Masonry in Ingotite Courses
MAT	Masonry in Natural Stone
PE	Polyethylene
PP	Polypropylene
PV	Polyvinylchloride
PVC	Polyvinylchloride Marex
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
WI	Wrought Iron
222	Unknown

SHAPES (S)

Arched	4	Rectangular
Circular	5	Special
Egg Shape	U	U Section
Flat Bottom		

NODE REFERENCING SYSTEM

1st digit:	Inserted nearest existing identifier
2nd digit:	Inserted nearest existing identifier
	Trial storage tank
3rd digit:	0 or 1 Public/Adopted
	2 or 3 Foul/Combined
	4 or 5 Surface Water
4th digit:	next sequential node

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

LEGEND - SEWERS

Manhole (SW)
Manhole (FAC)
Lamp hole (SW)
Pumping Station
Pumping Station (SW)
Pumping Station (FAC)
Side entry manhole (SW)
Side entry manhole (FAC)
Blind ended (SW)
Blind ended (FAC)
Vortex chamber (SW)
Vortex chamber (FAC)
Ancillary
Dummy/IG4 manhole
Outfall
Penstock chamber
Culvert
Storm Overflow
Backdrop manhole
Washout (SW)
Washout (FAC)
Rodding Eye (SW)
Rodding Eye (FAC)
Gauging point (SW)
Gauging point (FAC)
Intercept chamber (SW)
Intercept chamber (FAC)
Storm Tank (SW)
Storm Tank (FAC)
Vortex chamber (SW)
Vortex chamber (FAC)
Ancillary
Dimensional Chamber
Other (x)
Other
Change in sewer (s)
Valve
Reflux valve
Flap valve
Cascade
Weir
Hatch
Closed Valve
Air Valve
Hatch box (SW)
Hatch box (FAC)
Direction arrow
Emptying valve
Orifice plate
Inlet
Balancing Pond

Wastewater treatment works
Marina treatment works
Outfall headworks
Vent
Vent column
Tidal storage tank
Tank
Head of Public Sewer
Misc Pumping Station
Soakaway

166546

167577

Node	Cover	Invert	Size	Material	Shape	
0001X	50.78	48.94	300	UNK	CIRC	
010DX			150	UNK	CIRC	
0301X			225	UNK	CIRC	*
0301X			UNK	UNK	CIRC	*
0301X			150	UNK	CIRC	*
0302X			UNK	UNK	CIRC	
0303X			UNK	VC	CIRC	
0401X	52.78	47.73	300	UNK	CIRC	
0402X	52.88	47.4	300	UNK	CIRC	
040DX			300	UNK	CIRC	
0601X	50.93	47.74	225	UNK	CIRC	
060DX			UNK	UNK	CIRC	
0701X	50.8	48	225	UNK	CIRC	
0801X	50.15		225	UNK	CIRC	*
0801X			225	UNK	CIRC	*
090AX	52.507	48.868	800	DI	CIRC	
091AX	52.507	48.868	800	DI	CIRC	
1302X	51.39	48.31	300	UNK	CIRC	
130DX			UNK	UNK	CIRC	
1701X			UNK	UNK	CIRC	
1702X			225	UNK	CIRC	
1801X	50.53		225	UNK	CIRC	
2501X			UNK	UNK	CIRC	
2502X			225	UNK	CIRC	
2601X	47.23	45.68	300	UNK	CIRC	
260DX			150	UNK	CIRC	
3601X	47.92	44.13	300	UNK	CIRC	
3701X	47.71	44.51	300	UNK	CIRC	
4301X	47.7	43.22	300	UNK	CIRC	
4401X	48.41	43.57	300	UNK	CIRC	
4501X	48.26	43.87	300	UNK	CIRC	
450DX			UNK	UNK	CIRC	
4601X	48.12	44.11	300	UNK	CIRC	
510DX			UNK	UNK	CIRC	
5201X	46.95	43.05	300	UNK	CIRC	
5301X	46.82	43.09	300	UNK	CIRC	
5302X	46.89	43.14	300	UNK	CIRC	
5901X	47.73	45	150	UNK	CIRC	
5902X	47.44	44.52	150	UNK	CIRC	
5903X	47.31	44.06	150	UNK	CIRC	
5904X			150	UNK	CIRC	
6101X	48.25	42.67	400	UNK	CIRC	
6201X	47.23	42.88	300	UNK	CIRC	
6901X	47.26	43.64	150	UNK	CIRC	
6902Y	49.96	43.41	600	UNK	CIRC	
6903X	47.46	41.77	600	UNK	CIRC	
7001X	47.19	42.24	600	UNK	CIRC	
700DX			600	UNK	CIRC	
7101X	48.09	45.54	300	UNK	CIRC	
7102X	47.88		600	UNK	CIRC	
7103X	47.9	42.55	400	UNK	CIRC	
7201X	47.53	44.23	375	UNK	CIRC	
7801X	48.15	41.55	600	UNK	CIRC	
7802X	48.68	41.36	600	UNK	CIRC	
7803X	49.33	41.19	600	UNK	CIRC	
8101X	48.81	47.28	150	UNK	CIRC	
8102X	48.98	47	150	UNK	CIRC	
8103X	49.16	46.81	300	UNK	CIRC	
8104X	48.89	46.52	300	UNK	CIRC	
8105X	48.31		300	UNK	CIRC	
8106X	49.366	47.516	150	VC	CIRC	
8107X	49.36	47.18	150	VC	CIRC	
8201X	48.1	44.45	375	UNK	CIRC	
8401X	50.04		375	UNK	CIRC	
8701X	49.7	41.02	600	UNK	CIRC	
9001X	49.79	47.87	300	UNK	CIRC	
9100X	49.55	48.016	150	VC	CIRC	
9401X	51.48	46.87	300	UNK	CIRC	
9402X	50.5	46.85	225	UNK	CIRC	
9501X	50.58	47.31	225	UNK	CIRC	
9502X	50.71	47.04	225	UNK	CIRC	
9601X	46.76	40.64	600	UNK	CIRC	

Node	Cover	Invert	Size	Material	Shape

Node	Cover	Invert	Size	Material	Shape

LINE STYLES / COLOURS

- Brown: Foul; Foul Syphon Sewer; Foul Vacuum Main; Foul Rising Main
- Red: Combined; Combined Syphon Sewer; Combined Rising Main; Lateral Drain
- Orange: Building Over Agreement Area
- Dark Blue: Treated Effluent
- Purple: Sludge; Sewer Catchment; Section 104 Area
- Light Blue: Surface Water; Surface Water Rising Main
- Yellow: Private
- Green: Access Shaft; Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

Manhole (SW); Manhole (F&C); Lamp hole (SW); Lamp hole (F&C); Pumping Station (SW); Pumping Station (F&C); Side entry manhole (SW); Side entry Manhole (F&C); Blind shaft (SW); Blind shaft (F&C); Ejector station (SW); Ejector station (F&C); Watertight door (SW); Watertight door (F&C); Flushing ch. Mn-e (SW); Flushing ch. Mn-e (F&C); Flushing ch. No-e (SW); Flushing ch. No-e (F&C); Demarcation Chamber

Washout (SW); Washout (F&C); Rodding Eye (SW); Rodding Eye (F&C); Gauging point (SW); Gauging point (F&C); Intercept chamber (SW); Intercept chamber (F&C); Storm Tank (SW); Storm Tank (F&C); Vortex chamber (SW); Vortex chamber (F&C); Label ellipse; Dummy/S24 manhole; Outfall; Penstock chamber; Damboards; Storm Overflow; Backdrop manhole

Other (s); Other; Change in sewer (s); Change in sewer; Reflux valve; Flap valve; Cascade; Anode; Valve; Closed Valve; Air Valve; Hatch box (SW); Hatch box (F&C); Direction arrow; Emptying valve; Catchpit; Soakaway; Inlet; Balancing Pond

Wastewater treatment works; Marine treatment works; Outfall headworks; Vent; Vent column; Tidal storage tank; Blank end; Head of Public Sewer; Micro Pumping Station

SHAPES (S)

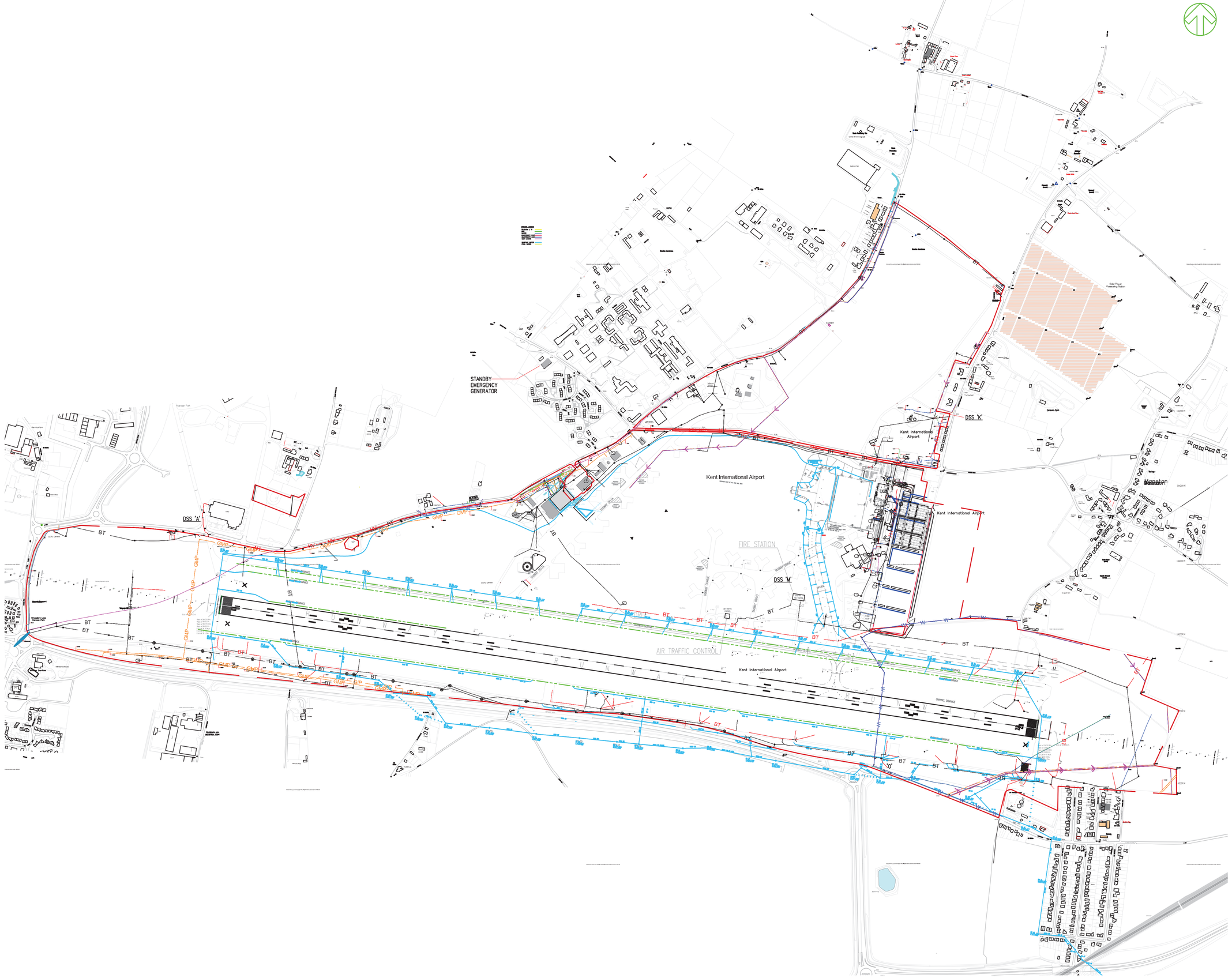
A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
3rd digit: sewer type identifier
0-4 = Foul/Combined
5-9 = Surface Water
4th digit: next sequential node

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement



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KEY TO GAS SYMBOLS:

- DIAMETER CHANGE
- END CAP
- BLIND SHAFT

KEY TO WATER SYMBOLS:

- FITTINGS
- FOUL USE MANHOLE
- SURFACE WATER MANHOLE
- SEWAGE PUMPING FACILITY
- WATER HATCH BOX

BT TO WATER SYMBOLS:

- DISTRIBUTION POINT
- JOINT BOX
- TELEGRAPH POLE
- MANHOLE

ELECTRICAL SYMBOLS

- STREET LIGHTING
- PME EARTH
- POLE MOUNTED TRANSFORMER

COLOR KEY:

- SITE BOUNDARY

ELECTRICAL SERVICES:

- HV — ELECTRICAL (HIGH VOLTAGE)
- LV — ELECTRICAL (LOW VOLTAGE)
- E — ELECTRICAL (SERVICE ROOT)

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GAS SERVICE:

- GLP — LHP MAINS
- GMP — MP MAINS
- GIP — IP MAINS

BT SERVICE:

- BT — UNDERGROUND PLANT
- BT — OVERHEAD PLANT
- BT — PROPOSED PLANT

MCNICHOLAS SERVICE:

- T — MCNICHOLAS PLANT

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P01	13.10.15	CRC	FIRST ISSUE	MT	BA

DRAWING STATUS: PRELIMINARY

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PROJECT: FORMER MANSTON AIRPORT

TITLE: UTILITY PLAN
EXISTING LAYOUT
COMBINED SERVICES
SHEET 6 OF 6

SCALE @ A1:	CHECKED:	APPROVED:
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	DESIGNED:	DRAWN:	DATE:
70009799	MT	CRC	OCT 2015

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KEY TO GAS SYMBOLS:
- DIAMETER CHANGE
- END CAP
- BLIND SHAFT

KEY TO WATER SYMBOLS:
- FITTINGS
- FOUL USE MANHOLE
- SURFACE WATER MANHOLE
- SEWAGE PUMPING FACILITY
- WATER HATCH BOX

BT TO WATER SYMBOLS:
- DISTRIBUTION POINT
- JOINT BOX
- TELEGRAPH POLE
- MANHOLE

ELECTRICAL SYMBOLS
- STREET LIGHTING
- PME EARTH
- POLE MOUNTED TRANSFORMER

COLOR KEY:
- SITE BOUNDARY

ELECTRICAL SERVICES:
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- LV — LV — ELECTRICAL (LOW VOLTAGE)
- E — E — ELECTRICAL (SERVICE ROOT)

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- TRUNK SURFACE WATER GRAVITY SEWER
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- TRUNK FOUL USE GRAVITY SEWER
- COMBINED RISING MAIN

GAS SERVICE:
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BT SERVICE:
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MCNICHOLAS SERVICE:
- T — MCNICHOLAS PLANT

PRIVATE LEGEND
- TELECOM / IT
- GAS
- WATER
- ELECTRICITY (HV)
- ELECTRICITY (LV)
- CCTV DUCTS
- SURFACE WATER
- FOUL WATER

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P01	27.10.15	CRC	FIRST ISSUE	BA	MAS

DRAWING STATUS: PRELIMINARY

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CLIENT: STONE HILL PARK

ARCHITECT: PLANIT

PROJECT: FORMER MANSTON AIRPORT

TITLE: UTILITY PLAN EXISTING LAYOUT COMBINED SERVICES SHEET 5 OF 6

SCALE @ A1:	CHECKED:	APPROVED:
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	DESIGNED:	DRAWN:	DATE:
70009799	MT	CRC	OCT 2015

DRAWING No: WSP-9799-GA-960-ST-205 REV: P01

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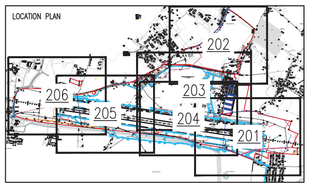
LOCATION PLAN



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- DIAMETER CHANGE
- END CAP
- BLIND SHAFT

KEY TO WATER SYMBOLS:
- FITTINGS
- FOUL USE MANHOLE
- SURFACE WATER MANHOLE
- SEWAGE PUMPING FACILITY
- WATER HATCH BOX

BT TO WATER SYMBOLS:
- DISTRIBUTION POINT
- JOINT BOX
- TELEGRAPH POLE
- MANHOLE

ELECTRICAL SYMBOLS
- STREET LIGHTING
- PME EARTH
- POLE MOUNTED TRANSFORMER

COLOR KEY:
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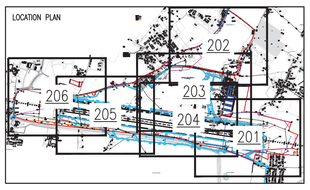
LOCATION PLAN



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DRAWING STATUS: PRELIMINARY

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CLIENT: STONE HILL PARK

ARCHITECT: PLANIT

PROJECT: FORMER MANSTON AIRPORT

TITLE: UTILITY PLAN
EXISTING LAYOUT
COMBINED SERVICES
SHEET 4 OF 6

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	DESIGNED:	DRAWN:	DATE:
70009799	MT	CRC	OCT 2015

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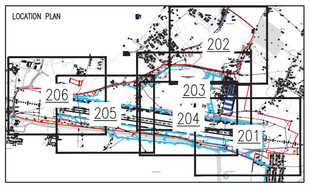
LOCATION PLAN



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PROJECT: FORMER MANSTON AIRPORT

TITLE: UTILITY PLAN
EXISTING LAYOUT
COMBINED SERVICES
SHEET 3 OF 6

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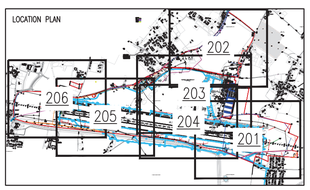
LOCATION PLAN



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P01	27.10.15	MT	FIRST ISSUE	BA	MAS

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CLIENT: STONE HILL PARK

ARCHITECT: PLANIT

PROJECT: FORMER MANSTON AIRPORT

TITLE: UTILITY PLAN
EXISTING LAYOUT
COMBINED SERVICES
SHEET 2 OF 6

SCALE @ A1:	CHECKED:	APPROVED:
1:2000	BA	MAS

	DESIGNED:	DRAWN:	DATE:
70009799	MT	CRC	OCT 2015

DRAWING No: WSP-9799-GA-960-ST-202 REV: P01

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KEY TO GAS SYMBOLS:
- DIAMETER CHANGE

KEY TO WATER SYMBOLS:
- FITTINGS
- FOUL USE MANHOLE
- SURFACE WATER MANHOLE
- SEWAGE PUMPING FACILITY
- WATER HATCH BOX
- END CAP
- BLIND SHAFT

BT TO WATER SYMBOLS:
- DISTRIBUTION POINT
- JOINT BOX
- TELEGRAPH POLE
- MANHOLE

ELECTRICAL SYMBOLS
- STREET LIGHTING
- PME EARTH
- POLE MOUNTED TRANSFORMER

COLOR KEY:
- SITE BOUNDARY

ELECTRICAL SERVICES:
- HV — HV — ELECTRICAL (HIGH VOLTAGE)
- LV — LV — ELECTRICAL (LOW VOLTAGE)
- E — E — ELECTRICAL (SERVICE ROOT)

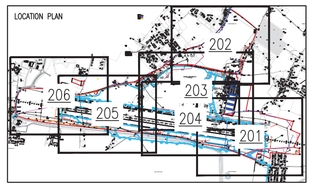
WATER SERVICES:
- SEWER CATCHMENT
- TRUNK SURFACE WATER GRAVITY SEWER
- TRUNK FOUL USE GRAVITY SEWER
- W — W — WATER LINE
- TRUNK FOUL USE GRAVITY SEWER
- COMBINED RISING MAIN

GAS SERVICE:
- GLP — LHP MAINS
- GMP — MP MAINS
- GIP — IP MAINS

BT SERVICE:
- BT — UNDERGROUND PLANT
- BT — OVERHEAD PLANT
- BT — PROPOSED PLANT

MCNICHOLAS SERVICE:
- T — MCNICHOLAS PLANT

LOCATION PLAN



PRIVATE LEGEND
- TELECOM / IT
- GAS
- WATER
- ELECTRICITY (HV)
- ELECTRICITY (LV)
- CCTV DUCTS
- SURFACE WATER
- FOUL WATER

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	28.10.15	MT	FIRST ISSUE	BA	MAS

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PROJECT: FORMER MANSTON AIRPORT

TITLE: UTILITY PLAN EXISTING LAYOUT COMBINED SERVICES SHEET 1 OF 6

SCALE @ A1:	CHECKED:		APPROVED:
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DRAWING No: WSP-9799-GA-960-ST-201 REV: P01

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Appendix F

Greenfield Calculations

IH 124 Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	169.479	Urban	0.000
SAAR (mm)	646	Region Number	Region 7

Results	**l/s**
QBAR Rural	459.0
QBAR Urban	459.0
Q1 year	390.1
Q1 year	390.1
Q2 years	404.3
Q5 years	587.5
Q10 years	743.5
Q20 years	919.4
Q25 years	985.9
Q30 years	1040.2
Q50 years	1202.5
Q100 years	1464.1
Q200 years	1721.1
Q250 years	1803.7
Q1000 years	2368.3

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ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	169.479	Urban	0.000
SAAR (mm)	646	Region Number	Region 7

Results l/s

QBAR Rural	459.0
QBAR Urban	459.0
Q1 year	390.1
Q1 year	390.1
Q30 years	1040.2
Q100 years	1464.1

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Appendix G

Conceptual Surface Water Drainage Layout

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER
ENGINEERING DRAWINGS AND SECTIONS - OUTLINE DRAINAGE STRATEGY
REGULATION 5(2)(o)
THANET DISTRICT COUNCIL

ILLUSTRATIVE PURPOSES ONLY

RSP

Table 1 - Pond Sizing	
1:100 Year Rainfall Event + 40% Climate Change	
Passed Forward Flow Rate 100 l/s	
Type	**Treatment + Attenuation**
Potentially Contaminated Area (m^2)	1,332,490
Average Storage Requirement (m^3)	155,010
Total Surface Area (m^2)	26,000
Depth per Pond(m)	5.96

Proposed permeable paving to be utilised for attenuation and conveyance of surface water runoff generated within the airport related business development area. Runoff to eventually discharge into ground via infiltration.

Proposed attenuation ponds Please refer to Table 1 for details

Pond 1

Pond 2

Hydro-Brake® Optimum or similar approved flow control device, to limit pass forward flow rate of 100l/s.

Existing pumping station, pump setup and rate TBC

Light Liquid Seperator to be used for de-icing stands

Runway 10/28

Existing Gravity Main to be made redundant. Inlet and outlet to be concreted.

See drawing: NK018417-RPS-B01-01-DR-S-2023 For Fuel Farm Drainage Layout.

Existing outfall to Pegwell Bay to be utilised

Notes

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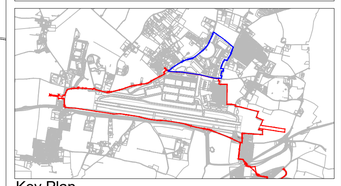
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. Shown attenuation features designed to convey and store runoff generated by rainfall event of up to 1 in 100 year + 40% Climate Change.
4. Surface Water runoff generated on site will be discharged into Pegwell Bay, south east of the site boundary.
5. A discharge rate of 100l/s is assumed. Confirmation of existing pump setup and rates would be required.
6. Method of capture of all surface water runoff is not shown.
7. Proposed drainage strategy is outline only, is shown indicatively and subject to detailed design.



Key Plan

Scale: NTS

Key:

- Manston Airport Site Area (254.099ha)
- Airport Related Business Development area (49.087ha)
- Surface Water Runoff Catchment from Roof Areas Only
- Contaminated Surface Water Runoff from Aprons, Taxiways and Roads
- Proposed Permeable Paving
- Proposed Light Liquid Seperator
- Existing Pumping Station
- Existing Gravity Main
- Proposed Gravity Main
- Existing Pumping Main to be Reused

Rev	Description	By	Ckd	Apr	Date
P03	Site Boundary and Drainage Network Revised	ST	RR	RR	21.03.18
P02	Site Boundary Revised	ES	RR	RR	23.02.18
P01	Site Layout Revised	ES	RR	RR	08.11.17

Project MANSTON AIRPORT DEVELOPMENT CONSENT ORDER

Title ENGINEERING DRAWINGS AND SECTIONS - OUTLINE DRAINAGE STRATEGY REGULATION 5(2)(o) THANET DISTRICT COUNCIL

Document Number		Revision
NK018417 - RPS-B01-01-DR-S-2020		P03
Project Number	Originator - Zone - Level - Type - Role - Drawing Number	
Application Number - TR02002		

Scale	Sheet Size	Sheet No	Status
NTS	A1	1 of 1	S. 56

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER
ENGINEERING DRAWINGS AND SECTIONS - FUEL FARM DRAINAGE LAYOUT
REGULATION 5(2)(o)
THANET DISTRICT COUNCIL

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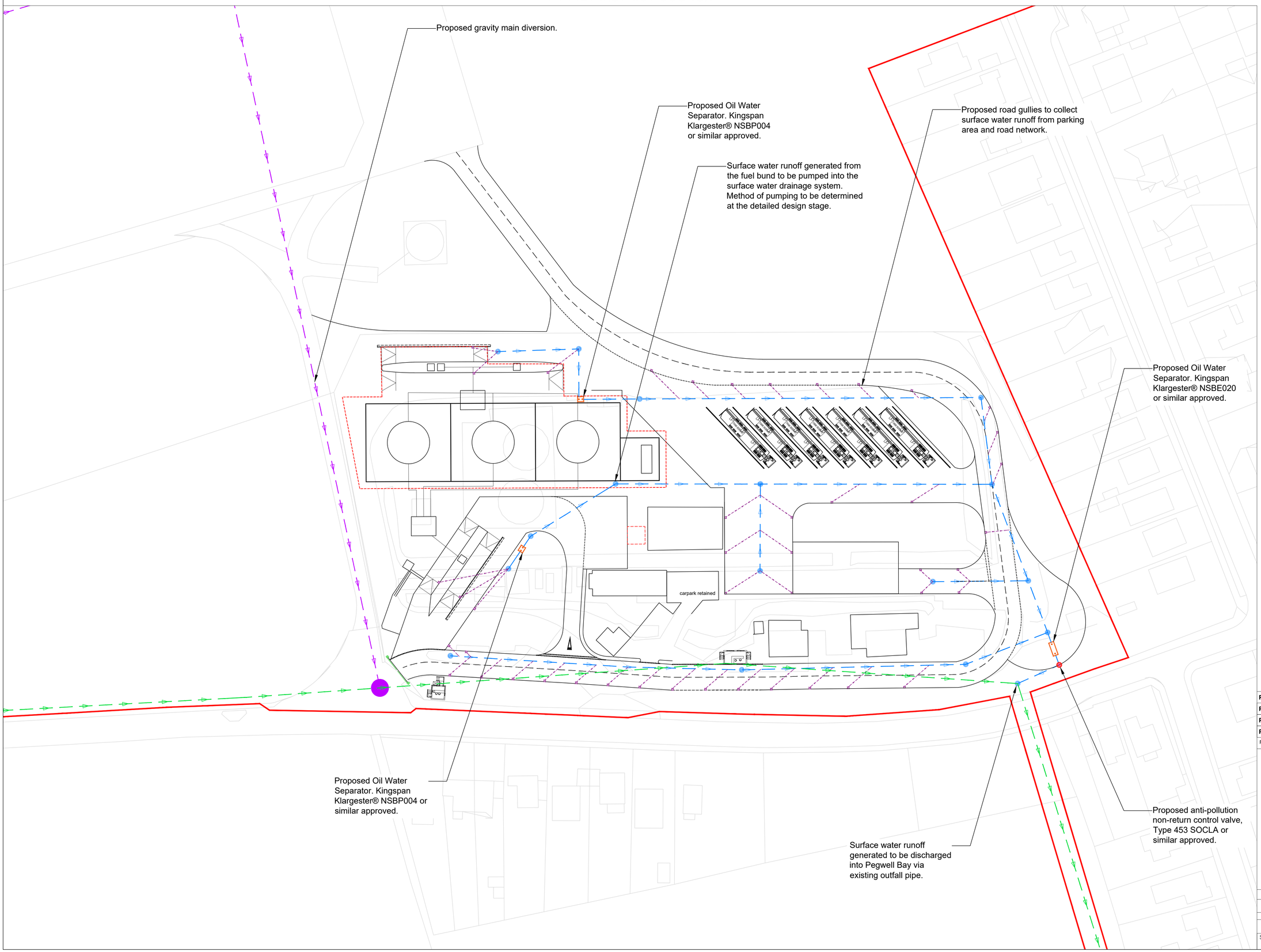

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2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. Storing of oil, design standards for fuel tanks and containers, should be in accordance to Environment Agency's requirements.
4. Shown attenuation features designed to convey and store runoff generated by rainfall event of up to 1 in 100 year + 40% Climate Change.
5. Surface Water runoff generated on site will be discharged into Pegwell Bay, south east of the site boundary.
6. Proposed drainage strategy is outline only, is shown indicatively and subject to detailed design.

Key:

- Order Limits
- Proposed Surface Water Network
- Proposed Road Gully
- Proposed Control Valve Chamber
- Proposed Manhole Chamber
- Proposed Oil Water Separator
- Existing Gravity Main
- Proposed Gravity Main

PIPES TO BE OVERSIZED TO ACCOMMODATE CLOSURE OF POLLUTION CONTROL VALVE WITHOUT FLOODING

Rev	Description	By	Ckd	Apr	Date
P04	General comments incorporated	ST	RR	RR	21.03.18
P03	Drainage layout amended	ES	RR	RR	23.02.18
P02	Drainage layout amended	ES	RR	RR	13.11.17
P01	Site layout revised	ES	RR	RR	08.11.17

Project MANSTON AIRPORT DEVELOPMENT CONSENT ORDER

Title ENGINEERING DRAWINGS AND SECTIONS - FUEL FARM DRAINAGE LAYOUT REGULATION 5(2)(o) THANET DISTRICT COUNCIL

Document Number	Revision
NK018417 - RPS-B01-01-DR-S-2023	P04
Project Number: Originator - Zone - Level - Type - Role - Drawing Number	
Application Number - TR02002	

Scale	Sheet Size	Sheet No	Status
1:500	A1	1 of 1	S. 56

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Appendix 8.3
Water Framework Directive Assessment Summary Note

RiverOak Strategic Partners

Manston Airport, Kent

Appendix 8.3
Water Framework Directive Assessment Summary Note

March 2018

Amec Foster Wheeler Environment
& Infrastructure UK Limited

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Document revisions

No.	Details	Date
1	Draft Report	March 2018
2	Final Report	28 March 2018
3		
4		
5		

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Contents

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1. Introduction

1.1 Background to this Report

1.1.1 This note has been produced to demonstrate how the assessment of the effects of the application to re-open Manston Airport (the 'Proposed Development') complies with the requirements of the Water Framework Directive (EC; 2000/60/EC) (WFD). The technical assessments which demonstrate compliance are contained with the Environmental Statement (ES) Chapters (**Chapters 6-17**), and the purpose of this document is to signpost the locations of the relevant assessments and to present the overall conclusions with respect to WFD compliance. This is in line with the guidance in PINS Advice Note 18: The Water Framework Directive[1].

1.1.2 The relevant sections of the ES are as follows:

- **Chapter 7: Biodiversity** and **Appendix 7.1: Report to Inform the Appropriate Assessment**;
- **Chapter 8: Freshwater Environment** and **Appendix 8.1 Hydrogeological Impact Assessment**;
- **Chapter 11: Land Quality**;
- **Chapter 17: Major Accidents and Disasters**; and
- **Chapter 18: Cumulative Effects**.

1.1.3 When these are referred to collectively in this report they are termed "the ES chapters and supporting appendices".

1.1.4 The Proposed Development is a Nationally Significant Infrastructure Project (NSIP), which will be authorised by a Development Consent Order (DCO). The decision will be made by the Secretary of State for Energy and Climate Change, as advised by the Planning Inspectorate (PINS). Further to this, the Environment Agency (EA) is the relevant permitting authority in relation to its role in issuing Environmental Permits under the *Environmental Permitting (England and Wales) Regulations 2016*.

1.1.5 In England, whilst the responsibility for ensuring that the WFD is implemented lies with EA, public bodies have a duty to 'have regard' to the objectives of the WFD in exercising their functions. In this case of the Proposed Development this includes Kent County Council (KCC) – which is the Lead Local Flood Authority (LLFA) which is responsible for consenting works in Ordinary Watercourses. In additional Natural England (NE) have responsibility for ensuring compliance with the Objectives and Measures associated with Natura 2000 sites, designated as Protected Areas under the WFD (see **paragraph 1.2.9**).

1.2 The Legislative Context –Water Framework Directive

1.2.1 The WFD came into force in 2000 and was first transposed into UK law in 2003 with the most recent transposition in 2017, with the principal aims of protecting and improving the water environment and promoting the sustainable use of water. *Environmental Quality Standards (EC; 2008/105/EC)* for priority substances were set by the daughter directive to the WFD (the EQS Directive and subsequent amendments *(EU, 2013/39/EU)* and the *Groundwater Directive (EC, 2006/118/EC)*.

1.2.2 The WFD sets a default objective for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve Good status. Although the WFD states that Good status should be achieved by 2015 the 2017[2] regulations stipulate that Good status should be achieved by 2021 or, in relation to water quality in respect of some priority substances, 2027. Where it is not possible to achieve Good status by 2027, alternative water body objectives can be set. The current (baseline) status, and the

[1] https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf

measures required to achieve the 2027 status objective are set out, for each water body, in the relevant River Basin Management Plans (RBMPs), as prepared by ES every six years (EA, 2015). The first RBMPs were published in 2009, and the current Cycle 2 RBMPs were published in December 2015. The plans provide the baseline condition of the water environment at the time of publication, and indicate the measures needed to achieve their target status.

1.2.3 In this report the 2009 RBMPs will be referred to as the "1st cycle" and the 2015 RBMPs as the "2nd cycle".

Surface waters

1.2.4 For surface water bodies (rivers, lakes, estuaries and coastal waters), overall water body status has an ecological and a chemical component. Ecological status is measured on the scale of high, good, moderate, poor and bad. Chemical status is measured as good or fail, based on the presence or absence of priority substances which present a risk to the environment. Good ecological status (GES) is defined as a slight variation from undisturbed natural conditions, with minimal distortion arising from human activity. The ecological status of water bodies is determined by examining biological elements (e.g. fish, invertebrates, plants) and a number of supporting elements and conditions, including physico-chemical (e.g. metals and organic compounds), and hydromorphological (e.g. depth, width, flow, and 'structure') factors.

1.2.5 Whilst GES is defined as a slight variation from undisturbed conditions in 'natural' water bodies, surface water bodies can also be designated as artificial or heavily modified water bodies (AWBs or HMWBs). These designations apply where there has been significant human influence on the nature of the water body such that they are considered to be unable to achieve the standards required to attain GES. Instead, AWBs and HMWBs have a target to achieve good ecological potential (GEP), which recognises their essential human use/s (e.g. flood protection, navigation), whilst making sure ecology is protected and enhanced as far as possible. The ecological potential for AWBs and HMWBs is also measured on the scale high, good, moderate, poor and bad. For those ecological elements that are sensitive to the human use of the water body, status is measured based on the presence or absence of a list of mitigation measures. These measures are set in order for the sensitive ecological elements to achieve the best aquatic health that is possible without compromising the human use of the water body. Ecological elements that are not sensitive to the human use of the water body are measured in the same way and with the same standards as for natural water bodies. Similarly, the chemical status of AWBs and HMWBs is also measured and classified in the same way as for natural water bodies.

1.2.6 In order for a surface water body to attain good 'overall' status, it must meet the requirements of GES or GEP, and achieve good chemical status. The achievement of good overall status by 2027 at the latest is the default WFD objective for almost all water bodies in the UK.

Groundwater

1.2.7 For groundwater bodies, Good status has quantitative and chemical components that are assessed via a series of 'tests', as shown in Diagram 1 below. Together, these provide a single final classification: good or poor status. Quantitative status is evaluated on the basis of overall aquifer water balance, impacts of abstraction on dependent surface waters or wetlands and potential for saline intrusion. Chemical status is evaluated on the basis of evidence for impacts of poor water quality, linked to Environmental Quality Standards (EQS), on dependent surface waters or wetlands or deterioration of the quality of groundwater used for potable supply.

1.2.8 There is also a trend objective set for groundwater bodies where environmentally significant and sustained rising trends in pollutant concentrations need to be identified and, where necessary, reversed.

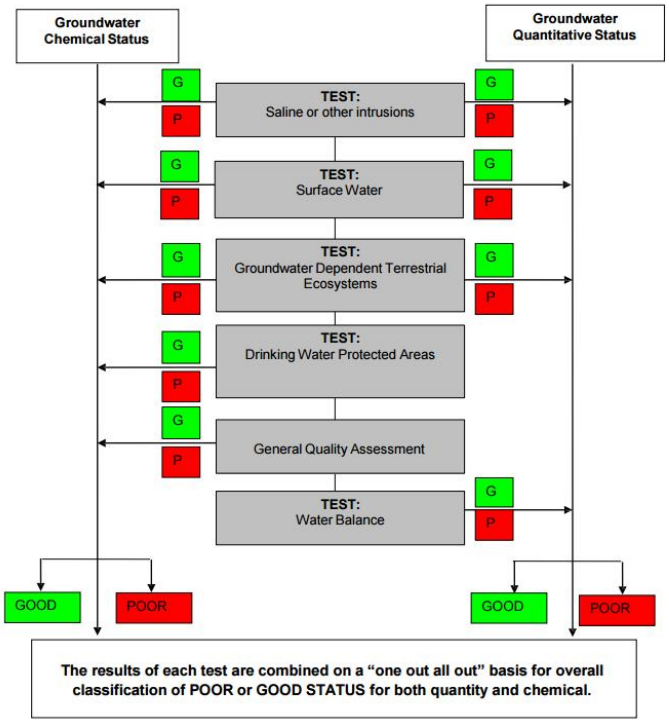

Figure 1: Overview of groundwater classification elements (UKTAG, 2012)

1.2.9 The WFD also requires the prevention of any input of priority substances and limiting (or control) of the input of all other substances to groundwater to prevent the deterioration of groundwater body status.

Protected areas

1.2.10 The WFD specifies that areas requiring special protection under other EC Directives and waters used for the abstraction of drinking water are identified as protected areas. These areas have their own objectives and standards. The following protected areas are relevant to this assessment:

- Areas designated for the abstraction of water for human consumption (Drinking Water Protected Areas - DWPA); and
- Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection including relevant Natura 2000 sites[2].

1.3 Report Structure

1.3.1 This WFD Assessment is an appendix to **Chapter 8 Freshwater Environment** of the ES, and is structured as follows:

- **Section 1 Introduction**: discussed the legislative requirements and context of the WFD in relation to the Proposed Development.
- **Section 2 WFD Baseline Environment**: sets out the WFD baseline for all the river, groundwater and transitional water bodies included in this assessment, and the justification for inclusion.

[2] The relevant Natura 2000 sites include water dependent Special Areas of Conservation (SAC) and Special Protection Areas for birds (SPA) identified in accordance with Article 6 of the Water Framework Directive, using the list of qualifying Natura features in Guidance on the Identification of Natura Protected Areas (UKTAG, 2003). These are referred to in this plan as 'Natura 2000 Protected Areas'.

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- **Section 3 Planned Activities**: identifies all the construction and operational activities planned as part of the Proposed Development which may result in potential impacts upon the baseline of these WFD water bodies.
- **Section 4 Embedded mitigation**: provides a summary of the embedded mitigation which has been presented in **the ES chapters and supporting appendices** to address potential impacts.
- **Section 5 Conclusions**: takes the outputs from Sections 2 – 4, and provides a statement of compliance with the objectives of the WFD.

2. WFD Baseline Environment

2.1 Introduction

2.1.1 This section provides a summary of the baseline water environment and sets out the approach to the screening of water bodies for the WFD Assessment. More detail on the wider baseline context can be found in the ES chapters (**Chapters 6-17**) and supporting appendices.

2.2 WFD Water Bodies Including in the Assessment

2.2.1 The approach to the inclusion of WFD water bodies is as follows:

- All freshwater surface water bodies that overlap the site boundaries, and the downstream transitional water bodies. There are no fresh water bodies upstream of the site; and
- All groundwater bodies which underlie the site.

2.2.2 These water bodies are mapped on **Figure 8.1** and comprise:

- The Monkston and Minster Marshes River water body (GB107040019621);
- The River Stour Transitional water body (GB520704004700);
- The Thanet Chalk Groundwater body (GB40701G500100);
- Sarre Penn, S. Chislet and Monkton Minster Marshes non-reportable river water body (GB107040019620). This is a water body which was in the 1st cycle RBMPs in 2009[3] is not reported in the second cycle RBMPs in 2015. Although there is no 2nd cycle baseline for this water body, it does still have protection under the WFD and there is still the aim for it to achieve Good status by 2027 at the latest. It should be noted that in the 2nd cycle the southern portion of this water body was re-designated as GB107040019621 (see above) and it is only the northern portion which is classified as non-reportable; and
- North Chislet Marsh non-reportable river water body (GB107040019770) (see commentary on non-reportable waterbodies above).

2.2.3 The baseline environment which these water bodies comprise is described in **Section 2.3**.

2.3 Baseline Summary

Groundwater

2.3.1 The Proposed Development is underlain by the Kent Isle of Thanet Chalk groundwater body (within the East Kent Chalk and Tertiaries Operational catchment). Online EA mapping and discussions with the EA and Southern Water (SW) (see **Tables 8.6** and **8.7** of **Chapter 8: Freshwater Environment**) indicates that the Proposed Development site is underlain by a Principal Aquifer, associated with the underlying Chalk, which can provide high levels of water storage. This aquifer supports local Public Water Supplies (PWSs) and is designated as a DWPA. The Thanet Formation has been classed as a Secondary A aquifer by the EA. A Secondary A aquifer is defined as a permeable layer capable of supporting water supplies at a local rather than strategic scale. Further detail on the site's underlying hydrogeology can be found in **Appendix 8.1**.

[3] Environment Agency, South East river basin district river basin management plan: 2009, https://www.gov.uk/government/publications/south-east-river-basin-management-plan

2.3.2 The site is located entirely within a groundwater SPZ catchment[4]. The inner zone (SPZ1), where risk of contamination from pollution causing activities is greatest, is identified in an area at the eastern end of the site and in a strip beneath the runway. This is surrounded by a wider area of outer zone (SPZ2) that also dominates the area beneath the runway, in the south of the site. The remainder of the site falls within the wider SPZ catchment area (SPZ3). These SPZs are presented on Figure 2.2 of **Appendix 8.1**.

2.3.3 The entire Proposed Development site is also located within a Safeguard Zone (SGZ)[5] and a groundwater Nitrate Vulnerable Zone (NVZ)[6], as shown on Figures 2.3 and 2.4 respectively of **Appendix 8.1**.

2.3.4 The Kent Isle of Thanet Chalk DWPA and the NVZ are both designated as Protected Areas under the WFD.

2.3.5 There a number of PWS boreholes located in the vicinity of the site, all licensed to SW. These are described in more detail in **Appendix 8.1,** and their locations are shown on Figure 3.2 of **Appendix 8.1**. The closest abstraction point is the Lord of the Manor source, located to the south-west of the site boundary. One of the adits which feeds this source, the so-called Western Adit, lies underneath the runway (see Figure 3.3 of **Appendix 8.1**). The Hydrogeological Impact Assessment (**Appendix 8.1**) includes the results of modelling work to delineate the catchment of the Lord of the Manor PWS around the site, the results of which can be seen in Figure 3.4 of **Appendix 8.1**.

Surface water

2.3.6 There are no river watercourses on or adjacent to the site (see **Figure 8.1**), partly due to the high permeability of the underlying chalk. The southern part[7] of the Proposed Development is located within the Monkton and Minster Marshes river water body (within the Stour Marshes Operational Catchment), which forms the catchment of the Minster Stream before it joins the River Stour 3km south of the site and flows into Sandwich and Pegwell Bays. A series of water channels and streams that form part of the Minster Marshes are located more than 1km to the south of the main site.

2.3.7 The current site's buried drainage pipeline lies in closer proximity to the north-western extent of this system, but aerial photography indicates that it does not cross any surface water features (see **Figure 8.1**). Currently runoff from the site infiltrates locally and, due to the highly permeable nature of the underlying geology, is unlikely to reach these surface water systems via overland flow routes. This highly permeable geology is the explanation for the lack of surface water features in and around the site.

2.3.8 The next surface water body downstream is the River Stour transitional water body (East Kent Coast Operational Catchment) which encompasses the tidally influenced lower reaches of the Stour, as well as Pegwell Bay. Although this water body is several kilometres to the south of the Proposed Development it has been considered as it receives discharge from the buried site drainage pipeline which extends from the southern portion of the site.

2.3.9 The entire site lies within the Sarre Penn, S. Chislet and Monkton Minster Marshes 1st cycle waterbody. The southern extent of which has been re-designated as the 2nd cycle Monkton and Minster Marshes river water body, and the northern section is a 2nd cycle non-reportable waterbody.

[4] The EA have defined SPZs for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. There are three main zones (Zone 1 - inner, Zone 2- outer and Zone 3 - total catchment). EA Groundwater source protection zones. Available online at: http://apps.environment-agency.gov.uk/wiyby/37833.aspx [Accessed 21/02/2018]
[5] Safeguard zones are non-statutory areas established for 'at risk' abstractions where land use, management practices and other activities can affect the quality of the raw water. Measures to prevent and reduce pollution are targeted within these zones.
[6] NVZs are areas designated as being at risk from agricultural nitrate pollution. They include about 58% of land in England. DEFRA reviews NVZs every four years to account for changes in water pollution. https://www.gov.uk/guidance/nutrient-management-nitrate-vulnerable-zones
[7] The runway and associated infrastructure.

Conservation sites

2.3.10 The north coast of the Isle of Thanet, located approximately 3.5km north of the site, is designated as a Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protected Area (SPA) and RAMSAR site. In closer proximity to the site are Sandwich and Pegwell Bays, located 1.5km to the south east. Together these bays are part of designated National Nature Reserve (NNR), RAMSAR, SSSI, SPA and SAC sites, which are described more fully in **Chapter 7: Biodiversity** of this ES. The proposed site, due to the proximity of Sandwich and Pegwell Bay SSSI, has been identified as falling within the associated SSSI risk zones.

2.3.11 Implementing the WFD contributes to outcomes for nature conservation and biodiversity by improving the water environment. The RBMPs include a summary of the measures needed for water dependent Natura 2000 sites to meet their conservation objectives. Supporting Site Improvement Plans (SIPs) provide an overview of the issues (both current and predicted) affecting the current condition, and outlines the priority measures required to improve the condition of the features. Sandwich Bay SAC, Thanet Coast and Sandwich Bay SPA and Thanet Coast SAC are water-dependent and fall under the North-East Kent (Thanet) SIP.

2.3.12 Measures for the Thanet Coast SAC and Thanet Coast and Sandwich Bay SPA were completed in 2015 to enable conservation objectives to be met according to the SIP. For Sandwich Bay SAC the measures will be complete by 2027, which requires implementation of management actions to address and adapt to changes in water levels affecting sand dune vegetation.

2.3.13 These SAC and SPA sites are designated as Protected Areas under the WFD.

Summary of water body status and objectives

2.3.14 The current baseline for three water bodies below in **Table 2.1** in the Study Area is based on 2015 Cycle 2 data, which is the most recent data available (EA, 2018). The river water bodies and transitional water body are assessed as being of Moderate overall status due to supporting ecological elements being of a lower quality than is needed to achieve ‘Good’ status. This failure is mainly linked to water quality elements. The groundwater body is assessed as being of Poor overall status due to both chemical and quantitative elements being of a lower quality than in needed to achieve ‘Good’ status. The objective is for each water body to achieve Good status by 2027.

2.3.15 Mitigation measure information in **Table 2.1** is taken from the EAs Catchment Data Explorer website and the EA dataset *Summary of the measures needed to achieve water body objectives for 2027 and beyond* (for sources of baseline information see **Chapter 8: Freshwater Environment**, **Table 8.3**).

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Table 2.1 RBMP Baseline Data for all water bodies in the Study Area

Water body name	Water body ID	Designation	Chemical Status	Ecological Status/ Potential	Overall Waterbody Status	Element not achieving Good	Reasons for not achieving Good status	Objective and Measures[8]
River water body (reportable)								
Monkton and Minster Marshes	GB107040019621	Designated as Heavily Modified Water Body	Good	Moderate	Moderate	Phosphate, Dissolved oxygen	P: Probable source: Sewage discharge (diffuse) from towns, cities and transport. DO – Probable source: physical modification and flow (land drainage - water level management).	"**Good" potential by 2027** Reduce diffuse pollution at source. Reduce diffuse pollution pathways (i.e. control entry to water environment). Mitigate/remediate diffuse pollution effects on receptor. Improvement to the condition of channel/bad and/or banks. Removal or modification of engineering structure. Change to operations and maintenance. Vegetation management. Water demand management. Control pattern/timing of abstraction. Use alternative source/relocate abstraction or discharge.
River water body (non-reportable)								
Sarre Penn, S. Chislet and Monkton Minster Marshes	*GB107040019620*	*Designated as Heavily Modified Water Body*	*Does not require assessment*	*Poor*	*Poor*	*Phosphate, Fish*	N/A	***"Good" potential by 2027*** *No measures assigned as water body not in 2015 RBMP*

[8] In this case measures are not available for the individual water bodies listed and the measures provided are those which have been listed against the relevant operational catchment.

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Water body name	Water body ID	Designation	Chemical Status	Ecological Status/ Potential	Overall Waterbody Status	Element not achieving Good	Reasons for not achieving Good status	Objective and Measures[8]
North Chislet Marsh	*GB107040019770*	*Designated as Heavily Modified Water Body*	*Good*	*Bad*	*Bad*	*Ammonia, Phosphate, Fish, Invertebrates*	N/A	***"Good" potential by 2027*** *No measures assigned as water body not in 2015 RBMP*
Transitional water body								
River Stour (Kent)	GB520704004700	None	Good	Moderate	Moderate	Phytoplankton and Dissolved Inorganic Nitrogen	Point Sources of pollution from Sewage Discharge and Diffuse sources of pollution from arable land use	**."Moderate" status by 2027** Reduce diffuse pollution at source. Mitigate/remediate diffuse pollution effects on receptor. Mitigate/remediate point source effects on receptor. Reduce point source pollution at source. Reduce point source pathways (i.e. control entry to water environment). Mitigate/remediate point source effects on receptor. Reduce point source pollution at source. Reduce point source pathways (i.e. control entry to water environment).
Groundwater body								
Thanet Chalk	GB40701G500100	None	Poor	Poor	Poor	Chemical and Quantitative	Point source pollutants from sewage discharge (intermittent) and contaminated land. diffuse sources of pollution from urban areas and unknown source (being investigated) and flow from	**"Poor" Status by 2027, Chemical Status "good" by 2027** The overall 2015 water body is of poor status (as a result of poor status for both quantitative and chemical components), with an overall water body objective to remain at poor status by 2015. Attaining the default (good status) is not justified under WFD because the costs of the measures exceed the benefits for the quantitative component. However, the chemical component has an objective to reach Good status by 2027. To achieve this the WFD highlights

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Water body name	Water body ID	Designation	Chemical Status	Ecological Status/ Potential	Overall Waterbody Status	Element not achieving Good	Reasons for not achieving Good status	Objective and Measures[8]
							groundwater abstraction.	improvements in relation to the area's Chemical Drinking Water Protected Area (DrWPA) and General Chemical Test.

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3. Planned Activities

3.1 Introduction

3.1.1 A full description of the Proposed Development is provided in **Chapter 3: Description of the Proposed Development** of the ES. The Proposed Development activities/ infrastructure types that are proposed within each individual water body and have the potential to impact the water environment are presented below in **Table 3.1**.

Table 3.1: Planned Activities and Infrastructure related to each WFD water body

Water body name	Planned Construction Activity/ Infrastructure Type		Potential connection from Activity/ Infrastructure to the WFD water body during each Phase
	Construction	**Operation**	
Monkton and Minster Marshes River Water body ***Sarre Penn, S. Chislet and Monkton Minster Marshes*** ***North Chislet Marsh***	• Rehabilitation and narrowing of existing runway, using overlay with bituminous materials	• Former airport fuel farm located to the SE of Proposed Development (operated by Jentex Group)	**Construction:** Potential for pollutants and sediments to reach watercourse via baseflow inputs (it is considered that the permeable nature of the underlying geology and the distance between the site and water features makes overland flow unlikely) (see **Chapter 8: Freshwater Environment**, **Section 8.4**), and **Operation:** Fuel spills could reach watercourse via baseflow inputs.
River Stour (Kent) Transitional Water body **(and associated Natura 2000 Protected Areas)**	• Treated construction site discharge to be taken off-site	•Treated operational site discharge to be taken off site • Fuel tanker and offloading bowser to the south of the site.	**Construction:** Site discharge would be conveyed via the current discharge pipe into Pegwell Bay, which lies within the water body boundary. **Operation:** Site discharge would be conveyed via the current discharge pipe into Pegwell Bay. Contamination may occur through fuel spillages during loading and offloading.
Thanet Chalk Groundwater body **(and associated Protected Areas – DWPA & NVZ)**	• Treated construction site runoff in the attenuation ponds; • Land raising, material imported to create a new raised building platform for cargo aircraft stands and taxiway; • Earthworks for the levelling of new apron areas and installation of drainage system; • Services for additional internal sub-stations, communication networks, and foul and surface water connections; • Rehabilitation and narrowing of existing runway, using overlay with bituminous materials; • 2 new apron areas constructed between the runway and B2050 Manston Road;	•Water quality treatment in attenuation ponds. 1 receiving 'dirty' runoff (e.g. de-icer), 1 receiving 'clean' runoff (e.g. rooftop drainage); • Water Treatment Facility will utilise substances for cleaning and pH re-balancing (e.g. Cl, Al, metals, and acids); • Storage and application of de-icing chemicals on-site (Glycols); • Storage and application of organic chemicals in the form of solvents, fuels for aircraft maintenance	**Construction:** During landraising there is potential for existing made ground deposits to be disturbed and leach into underlying aquifers. During break up of runway ground vibration could lead to increased turbidity in the groundwater, particularly works in the vicinity of the adit under the runway; Deep foundation piling and deep excavations may create vertical pathways into the unsaturated zone; Application of pesticides could result in increased leaching of nitrates into underlying aquifer; Dewatering has the potential to draw in contaminated water from elsewhere on site or from offsite sources, creating new pathways or altering existing pathways; and

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Water body name	Planned Construction Activity/ Infrastructure Type		Potential connection from Activity/ Infrastructure to the WFD water body during each Phase
	Construction	Operation	
	• Relocation of cargo facilities and ground regrading to the north of existing location; • 3 Avgas fuel storage tank would be provided; • Aircraft Maintenance Repair and Overhaul (MRO)/passenger service construction (in place of existing terminal) • Reprofiling for existing taxiway network modifications (inc. new taxiways and stands); • Demolition, foundation piling or break up of runway ground (vibration and shaking); • Ground reprofiling and mounding for landscape zone between new internal access road and public highway; • Application of pesticides to the fringe areas around the runway; • Dewatering may be required for deep excavations on-site, and • Borehole construction for deep site investigation	• Application of pesticides/herbicides to control vegetation growth. Limited to areas of active drainage; • Mechanical control of weeds in areas that freely drain into underlying chalk; • Foul drainage and surface water drainage system network conveying substances including nitrates, pesticides, organic solvents towards Southern Water connections.	Borehole construction could create vertical pathways within the unsaturated zone. **Operation** Main pathway is from (fuel, and chemical) storage areas on the surface to the Chalk groundwater by vertical flow through fissures in the unsaturated zone and then lateral flow in the saturated zone. There is potential for leakage and leaching from foul drainage system network into the underlying aquifer

3.1.2 **Table 3.1** has identified a range of planned activities and infrastructure types which pose a potential risk towards each of the relevant WFD water bodies. The table indicates that the majority of risks are related to the Thanet Groundwater body. This is due to the hydrogeological properties of the chalk which provides a potential pathway by infiltration and vertical/ lateral flow into the underlying aquifer. Although there is less potential connectivity towards the Monkton and Minster Marshes water body, and the River Stour transitional water body, there are potential effects as a result of site runoff or surface water discharges during the construction phase.

3.1.3 The potential impact on the Thanet Groundwater body, and dependant public water supply abstractions, has been the driver for the production of the Hydrogeological Impact Assessment in **Appendix 8.1**.

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4. Embedded mitigation

4.1 Overview

4.1.1 This section provides a link to the descriptions of environmental measures that are incorporated into the development proposals in order to avoid, reduce or compensate for the potential adverse effects on the WFD water bodies identified in Section 3.

4.2 Consultation

4.2.1 The approach to the development of embedded mitigation has been discussed with the EA, NE, SW, Thanet District Council (TDC) and KCC. A summary of these consultations can be found in:

- **Chapter 7: Biodiversity**, **Section 7.3**;
- **Chapter 8: Freshwater Environment**, **Tables 8.4-8.9**; and
- **Chapter 10: Land Quality**, **Tables 10.4-10.8**.

4.3 Environmental measures incorporated into the proposed development

4.3.1 The environmental measures for each phase of the Proposed Development are captured in the ES chapters (**Chapters 6-17**) and appendices. The relevant sections of these documents are listed in **Table 4.1**.

Table 4.1: Location of Environmental Measures in the ES

Water body name	Location of Environmental measures in the ES
Monkton and Minster Marshes River Water body ***Sarre Penn, S. Chislet and Monkton Minster Marshes*** ***North Chislet Marsh***	**Chapter 8: Freshwater Environment**, Table 8.13 (Construction), Table 8.14 (Operation). **Chapter 17: Major Accidents and Disasters**, Table 17.6 (construction), Table 17.7 (operation)
River Stour (Kent) Transitional Water body (and associated Natura 2000 Protected Areas)	**Chapter 7: Biodiversity**, Table 7.7 **Chapter 8: Freshwater Environment**, Table 8.13 (construction), Table 8.14 (operation) **Chapter 10: Land Quality**, Table 10.9 (construction), Table 10.10 (operation **Chapter 17: Major Accidents and Disasters**, Table 17.6 (construction), Table 17.7 (operation)
Thanet Chalk Groundwater body (and associated Protected Areas – DWPA & NVZ)	**Chapter 8: Freshwater Environment**, Table 8.13 (Construction), Table 8.14 (Operation). **Chapter 10: Land Quality**, Table 10.9 (Construction), Table 10.10 (Operation). **Chapter 17: Major Accidents and Disasters**, Table 17.6 (construction), Table 17.7 (operation)

4.4 Detailed Design

4.4.1 The detailed design stage is expected to be guided by a number of DCO requirements to ensure that appropriate measures are incorporated into the DCO design and designs are approved by SW, NE and the EA. These will comprise:

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- Consultation with the EA and SW on the detailed design of the site (including the Fuel Storage area), the approach to construction phasing, the development of the CEMP and the development of monitoring locations, plans and polices to mitigate the impact from any spills, leaks or other accidents on the Thanet Chalk Groundwater Body and associated DWPA/NVZ Protected Areas; and
- Consultation with NE and the EA with respect to the details of the regulation of peak rates and water quality of the site discharge to Pegwell Bay in the River Stour (Kent) Transitional Water body and associated Natura 2000 Protected Areas.

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5. Conclusions

5.1 Overview

5.1.1 The assessment of effects for each phase of the proposed development is captured in the ES chapters (**Chapters 6-17**) and appendices. The relevant sections of these documents are listed in **Table 5.1**.

Table 5.1: Location of Assessment of effects in the ES

Water body name	Location of the Assessment of Effects and additional mitigation in the ES
Monkton and Minster Marshes River Water body ***Sarre Penn, S. Chislet and Monkton Minster Marshes*** ***North Chislet Marsh***	**Chapter 8: Freshwater Environment**, Section 8.9 **Chapter 17: Major Accidents and Disasters**, Section 17.9 **Chapter 18: Cumulative Effects**, Section 18.3
River Stour (Kent) Transitional Water body	**Chapter 7: Biodiversity**, Section 7.9 **Chapter 8: Freshwater Environment**, Section 8.10 **Chapter 10: Land Quality**, Section 10.10 **Chapter 17: Major Accidents and Disasters**, Section 17.9 **Chapter 18: Cumulative Effects**, Section 18.3
Associated Natura 2000 Protected Areas	Appendix 17.1: Report to Inform the Appropriate Assessment
Thanet Chalk Groundwater body	**Chapter 8: Freshwater Environment**, Section 8.8 **Chapter 10: Land Quality**, Section 10.9 These chapters base their conclusions on Appendix 8.1: Hydrogeological Impact Assessment, Section 4.4.5. **Chapter 17: Major Accidents and Disasters**, Section 17.8 **Chapter 18: Cumulative Effects**, Section 18.3
Associated DWPA and NVZ Protected Areas	Appendix 8.1: Hydrogeological Impact Assessment

5.1.2 Each WFD water body was considered to have activities/ infrastructure types resulting from the Proposed Development within them or in close enough proximity that could cause some degree of risk to the delivery of the WFD objectives. Upon assessment of these activities/ infrastructure types, and taking into the effectiveness of mitigation in Section 4 in managing any effects, it can be concluded that the Proposed Development is compliant with the WFD. Therefore, there is no requirement for an Article 4.7 assessment.

5.2 Will the Proposed Development Lead to Deterioration in WFD Status of any Water Body in the Study Area?

5.2.1 Based on the assessment provided in this document, along with the findings presented in the ES chapters (**Chapters 6-17**) and Appendices**,** no components or phases of the Proposed Development would lead to a deterioration of any WFD elements or the WFD status of any water

body in the study area. It is concluded that the mitigation package presented in section 4 would avoid deterioration as a result of the Proposed Development.

5.3 Will the Proposed Development Compromise the Achievement of Good Status in any WFD Water Body in the Study Area?

5.3.1 Based on the assessment provided in this document, no components or phases of the Proposed Development would compromise the ability of any WFD water body to attain WFD target status, this includes the WFD mitigation measures in **Table 2.1**.

5.4 Will the Proposed Development Contribute Towards a Cumulative Deterioration of WFD Status (in Combination with Other Projects) or Prevent the Cumulative Enhancement of Status (up to 2027)?

5.4.1 The standard mitigation measures committed to as part of the Proposed Development will ensure that there is no potential for the Proposed Development to contribute to any cumulative effects, and as such, cumulative effects will not preclude the delivery of WFD objectives.

5.5 Will the Proposed Development Compromise the Achievement of Protected Area Objectives?

5.5.1 Based on the information provided in the ES chapters (**Chapters 6-17**) and Appendices and the findings within this document, no components or phases of the Proposed Development would compromise the conservation objectives of any protected areas. The results of the Protected Area assessments can be found in **Appendix 17.1** and **Appendix 18.1**.

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6. References

Council Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 on establishing a framework for Community action in the field of water policy (the Water Framework Directive)

Council Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council (the Priority Substances Directive).

Council Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy.

The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Council Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (the Groundwater Directive) including Commission Directive 2014/80/EU which amends Annex II of the original Directive 2006/118/EC.

Environment Agency, 2015. South East River Basin Management Plan,

Environment Agency 2009, South East river basin district river basin management plan: 2009, https://www.gov.uk/government/publications/south-east-river-basin-management-plan

Environment Agency, 2018. Catchment Data Explorer, http://environment.data.gov.uk/catchment-planning/ (accessed 23/02/2018)

UK Technical Advisory Group on the Water Framework Directive (2012) Paper 11b(i) Groundwater Chemical Classification for the purposes of the Water Framework Directive and the Groundwater Directive