CampbellReith
consulting engineers

Innovation Park Medway

SuDS Design and Development Process

For:

INNOVATION PARK MEDWAY

Project Number:

12841

August 2018

Campbell Reith Hill LLP
Raven House
29 Linkfield Lane
Redhill
Surrey RH1 1SS

T:+44 (0)1737 784500
F:+44 (0)1737 784501
E:surrey@campbellreith.com
W:www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	03.07.2018	Draft for Internal Review	AJHmc12841-030718-SuDS Design and Development Process-D1.doc	AJH	MC	SB
F1	31.08.2018	For Information	AJHmc12841-030718-SuDS Design and Development Process-F1.doc	ST	SB	SB

Document Details

Last saved	31/08/2018 16:09
Path	AJHmc12841-310818-SuDS Design and Development Process-F1.doc
Author	Andy Higgins
Project Partner	Simon Boots
Project Number	12841
Project Name	Medway

Contents

Appendices

Tables

1.0 SITE DESCRIPTION AND DEVELOPMENT DESCRIPTION

1.1. Rochester Airport is located near the Medway estuary, approximately 3km south of the towns of Chatham and Rochester, Kent. The Site currently functions as an airport for private and leisure users and has two runways, which are served by a number of hangars and smaller airport buildings in the south of the Site. The total site area is approximately 44.70ha and the existing topography falls broadly from the south to the north of the Site.

1.2. The proposed scheme involves the redevelopment of Rochester Airport, comprising of approximately 101,000m2 of B1/B2 class business units in the north and west of the Site. The Proposed Development will result in the decommissioning of runway 16/34 while the remainder of the Site will continue to utilise the secondary runway as a fully functional airport. The proposed site area is relatively flat with existing levels approximately between 115m and 125m AOD.

2.0 STAGE 1: STRATEGIC SURFACE WATER MANAGEMENT OBJECTIVES

2.1. This section of the report sets out the strategic surface water management objectives for the Proposed Development.

2.2. Medway Council (MC), and Tonbridge and Malling Borough Council (TMBC) are preparing a masterplan for the development of approximately 18.65 hectares (ha) of land on the current site of Rochester Airport, referred to as the 'Proposed Development', for employment led development and supporting infrastructure. The site location plan for this area is shown in Appendix 1. The masterplan for the Proposed Development can be found in Appendix 2.

2.3. The development is to be progressed by way of a Local Development Order (LDO) in accordance with Section 61A of the Town and Country Planning Act 1990. No pre-application discussions regarding drainage have been undertaken with the local planning authority, Lead Local Flood Authority (LLFA), or local water and wastewater undertaker (Southern Water) at this time.

2.4. A previous Flood Risk Assessment (FRA) was undertaken in 2014[1] in support of a planning application to upgrade and improve the existing airport buildings in 2014.

2.5. A Flood Risk Assessment (FRA) has been prepared to support this development and can be found in Appendix 3.

Table 2.1: Strategic Surface Water Management Objectives

Delivery Area	Strategic Objective
Water Resource	The Site is within an area of water stress and there are sufficient drivers for the use of rainwater harvesting systems in terms of drainage hierarchy. The client is keen to implement RWH systems where possible.
Flood Risk	If discharging to a watercourse or sewer, rates and volumes of surface water discharge from the Site are to be controlled to mimic existing discharge conditions. The Environment Agency's Flood Map for Planning[2] shows that the majority Northern Site is at very low risk of flood, with some small areas of low to medium risk towards the northern boundary; there is also a low to medium to high risk overland flow route towards the north west. This flow route is to be maintained in order to minimise the risk of surface water flooding on Site. The majority of the Southern Site is at very low risk of surface water flooding, with some areas of low to medium risk towards the north eastern boundary of this Site, with a northerly overland flow route. This should be mitigated through the use of SuDS systems. The Site is within a Flood Zone 1, low risk of fluvial flooding, and the TMBC climate change maps confirm that there is no future risk due to climate

[1] Robert Walpole and Partners. (2014). *13H01-FRA01*.
[2] https://flood-map-for-planning.service.gov.uk/

	change; therefore, no measures will be required to mitigate this. Strategic Flood Risk Assessments (SFRA) prepared on behalf of TMBC[3] and MC[4] do not identify any significant risk of groundwater flooding within the district; therefore, no measures will be required to mitigate this. There are no known coastal flood risks on or adjacent to the Site; therefore, no measures will be required to mitigate this.
Water Quality	The surface water drainage system for the Site will sufficiently mitigate pollutants as per the water quality design standards set out in Section 4.3 of The SuDS Manual to support the management of water quality in the receiving surface water and groundwater.
Amenity	For providing appropriate amenity value in the SuDS design, opportunities include: • Maintaining the alignment of runway 16/34 and replacing with a blue/green corridor comprised of planting and swale for conveyance and treatment of water • Sitewide tree planting and soft landscaping
Habitat and Biodiversity	The green/blue corridor and tree planting around the Site would encourage biodiversity and create habitats for a variety of wildlife. However, due to the function of the Site as a working airfield, it may not be safe or practical to encourage nesting of larger birds through the use of brown roofs or nest boxes. The presence of an adjacent airfield should be considered in the design of SuDS devices, and advice should be sought from a specialist in doing so.
Climate Resilience	Strategic objectives for water resources, flood risk, habitat and biodiversity will all contribute to climate resilience.
Approval and adoption	Medway Council are the Lead Local Flood Authority (LLFA) and are responsible for managing the risk of flooding from: • groundwater - caused when heavy or prolonged rainfall makes the water table rise above its normal level • surface water (rainfall) runoff - flows over surfaces such as roads, roofs and patios that cannot absorb water • ordinary watercourses - smaller, non-main rivers and water bodies. These include rivers, streams, ditches, drains, cuts, culverts, dikes, and sluices As the LLFA, MC are a statutory consultee for 'major' developments and will be consulted through the Local Planning Authority when an application is submitted for determination that meets the 'major' definition; the Proposed Development is considered to be 'major' development. The development is to be undertaken as part of a Local Development Order (LDO) in accordance with section 61A of the Town and Country Planning Act 1990. Planning permission has not been granted at time of writing.

[3] Mott MacDonald, (2006). *Strategic Flood Risk Assessment - Tonbridge and Malling Borough Council - Stage 2 Report.*
[4] Mott MacDonald, (2006). *Medway Strategic Flood Risk Assessment – Main Report.*

	Anglian Water should be approached with the view to adopt and maintain the strategic drainage components that lie within public open space, including both surface components and subsurface pipework, provided this is in accordance with the client's wider security and ownership strategy. The drainage within the commercial and industrial plots will be owned and maintained by the relevant site owners.

3.0 STAGE 2: CONCEPTUAL DESIGN

3.1. Step 1: Site and Development Characterisation

3.1.1. The aim of Site Characterisation is to develop an understanding of relevant features of the Site and the surrounding area that could influence the SuDS design criteria and design options. These are considered in the Table 2.1 below.

Table 3.1: Strategic Surface Water Management Objectives

Delivery Area	Strategic Objective
Site Topography	The Site generally falls from South to North. The Proposed Development area is relatively flat with existing levels approximately between 115m and 125m AOD.
Existing Flow Routes and Discharge Points	There are no existing watercourses present on site. The River Medway runs west-east approximately 2.5km to the north of the Site. Currently, all surface water on the developed site drains via infiltration, while overland flow discharges to the west onto Laker Road. Other than the private airport network there are no surface water sewers on the existing site.
Potential for Infiltration	The Site geology is primarily clay with flint, underlain by highly permeable Seaford Chalk strata which occurs at a depth of around 2.20m bgl and below. Any infiltration drainage would need to be located within this productive strata. A historic drainage strategy[5] compiled in 2014 derived an infiltration rate of 19.8m/hr ($5.5x10^{-3}$m/sec) from a back-analysis of the existing drainage. The exact infiltration rate would need to be determined on Site via site specific soakaway testing, however, this indicative rate would suggest soakaways are a viable option. However, as these rates have not been determined from the on-site conditions, but from tests in adjacent areas, a conservative rates of $1.0x10^{-4}$m/sec will be assumed until testing can be carried out on Site. There has been no recorded groundwater flooding in the past and due to the relatively elevated location of the Site in comparison to the surrounding area this is not considered a risk. EA mapping indicates that the Site lies over a Source Protection Zone I (inner protection zone) and Source Protection Zone II (outer protection zone). As a result appropriate measures must be taken for pollution mitigation of infiltrated surface water runoff.
Potential for Surface Water Discharge	The River Medway is situated approximately 2.5km to the north; this distance is deemed too great to provide a practical discharge point. Infiltration offers the most suitable option for surface water drainage as per the existing Site conditions.
Site Flood Risks	There are no known coastal flood risks on or adjacent to the Site. There are known fluvial, pluvial and groundwater flood risks on Site but no

[5] Robert Walpole and Partners. (2014) Rochester Airport - *Drainage Conceptual Design Statement*

	development is proposed within these areas.
Existing Site Land Use	The Site is currently made up of Rochester Airport and associated infrastructure and greenspace.
Existing Site Infrastructure	Asset records indicate that there are existing services which partially cross the Northern Site. There appear to be Virgin media cables and a gas main which run along the northern boundary, while there are BT cables running around the area of land currently used by BAE systems. There is also a high voltage electric cable which bisects the Northern Site east-west. These assets will require relocation prior to construction. A Southern Water foul sewer runs south-north parallel to the Northern Site in Laker Road. Asset records also indicate that there are SGN gas connection to the Southern Site, now abandoned, crossing the eastern boundary from Maidstone Road. Further asset enquiries should be made for the Southern Site to determine the presence of other utilities. A Southern Water foul water sewer runs along the southern boundary of the Southern Site, which connects to a foul water sewer running south-north within Maidstone Road on the eastern boundary of the Southern Site. A Southern Water surface water sewer also runs south-north within Maidstone Road. Southern Water asset plans displaying drainage infrastructure can be found in Appendix 4.
Existing soils	The British Geological Survey (BGS) Mapping[6] shows that the Site is underlain with Seaford Chalk Formation – Chalk with Superficial deposits of Clay-with-flints Formation - Clay, Silt, Sand And Gravel. The Seaford Chalk Formation is highly likely to support soakaway drainage.
Local habitats and biodiversity	The dominant landscape on Site is mowed grassland and therefore very little is provided in the way of habitat for wildlife. Due to the nature of the current Site use there are very few trees which would suggest limited bird nesting and subsequent activity on Site. A survey undertaken in January 2018 concluded the area is 'hardly used by foraging nor commuting bats'[7]. There is evidence of reptile habitats in the north of the Site; particularly the brush and 'scrubby bank'[8]. This will need to be managed suitably before construction begins.
Local landscape and townscape	The development areas are situated in the north western and southern parts of Rochester Airport, which is surrounded by commercial/industrial land on three sides. The M2 motorway runs north north west to south south east to the west of the Site while the airport buildings and a caravan park lie within the southern area of the airport, partially occupying the Southern Site.

3.1.2. The outcome of the Site Characterisation is presented graphically in Appendix 5.

[6] BGS - Geology of Britain Viewer: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[7] KB Ecology Ltd. (2018). *Rochester Airport, Masterplan Area B: Bat Night-time Surveys.*
[8] KB Ecology Ltd. (2018). *Rochester Airport, Masterplan Area A: Reptile Survey.*

3.1.3. The aim of Development Characterisation is to develop an understanding of relevant features of the Proposed Development that could influence the SuDS design criteria and design options. These are considered in Table 3.2 below.

Table 3.2: Development Characterisation Outcomes

Item	Strategic Objective
Proposed Topography, Land Use and Landscape Characteristics	The Site is split into two key areas: The Northern Site is the larger of the two areas and incorporates some of the existing runway 16/34 and the land let to BAE systems, currently used for car parking. The Proposed Development in this area has been divided into parcels 1, 2, 3, and 4, and is to be occupied by a mixture of business units and accompanying parking areas. The existing alignment of runway 16/34 is to be maintained as a green corridor running, and trees and other public space are to line the principle access routes from Laker Road. The Southern Site is currently occupied by a caravan park, as well as areas of existing hardstanding, and some wooded areas. The Proposed Development in this area is formed of parcel 5, and is to be occupied by a mixture of business units and accompanying parking areas.
Proposed Flood Risk Management Strategy	SuDS components can lie within Flood Zone 1. Surface water flood events will be managed by SuDS features incorporated in the proposed system and by the maintenance of overland flow routes. On the Northern Site, the existing runway alignment will be retained and become a green blue/corridor feature that conveys surface water runoff from the wider catchment area to the infiltration features.
Proposed Site Infrastructure	On both sites, the surface water management system will need to be integrated with the network of proposed services and planned road infrastructure.
Proposed Building Use, Style and Form	The development is for commercial use only. The use of SuDS features, particularly vegetated features, in areas between units and either side of access routes could provide a benefit to public amenity. On the Northern Site, the proposed blue/green corridor running along the alignment of the runway 16/34 will not only convey and store water, but also provide significant amenity and wildlife benefits.
Proposed Adoption and Maintenance	For details of adoption, refer to Table 1.1. It is likely that the maintenance of drainage systems serving individual units (i.e. Rainwater harvesting systems) will be maintained by the respective tenants, while drainage features with a shared use (permeable paving/tree pits/swales etc), will be maintained by an appointed maintenance contractor. Anglian Water will be approached with a view to adopt foul and surface water drainage in open spaces.

3.1.4. The outcome of the Development Characterisation is presented graphically in Appendix 5.

3.2. Step 2: Establish SuDS Design Criteria

3.2.1. The design criteria for the Proposed Development has been produced, in accordance with:

- The design criteria laid out within Chapter 3 to 6 of The SuDS Manual.
- The Strategic Surface Water Management Objectives.
- The opportunities and constraints identified by the Site and Development Characterisation.
- The guidance laid out within Chapter 8 to 10 of The SuDS Manual.

Table 2.3: SuDS Design Criteria for the Site

	Delivery of Design Criteria
Water Quantity	1. Use rainwater harvesting systems where possible. 2. Discharge to groundwater, not sewers or watercourses. 3. Ensure that the selected SuDS components drain sufficiently quickly that the system is prepared for managing further rainfall. 4. Maintain the alignment of runway 16/35 as a green/blue corridor for amenity, biodiversity, water conveyance and storage. 5. Ensure that all surface water is retained within the SuDS components for events up to the critical 1:30 year event and contained within appropriate exceedance routes and storage areas up to the critical 1:100 year event and to include relevant climate change and urban creep allowances.
Water Quality	1. Ensure appropriate pollution control operational processes are in place in all areas to minimise the risk of serious pollution events occurring. In particular for areas of high vehicle trafficking/deliveries. This is of particularly importance where infiltration is occurring within the source protection zones on Site. 2. Provide treatment of surface water runoff to meet the requirements of Water Quality Standard 2 as described in Chapter 26 of The SuDS Manual. 3. Ensure the impact of periodic extended wet and dry periods (potentially more likely under climate change scenarios) would not invalidate treatment performance. Use drought tolerant grasses and shrubs for filter strips, swales, etc. Ensure suitable water supply for tree pits.
Amenity	1. Integrate car parking, recreational and amenity space, identified green corridors and public open spaces with the surface water management system. 2. Use water to support vegetation to enhance civic space, the road environment and public open space – in particular the blue/green corridor. 3. Recreate historic runway alignment. 4. Keep side slopes to accessible water features (swales) easily accessible and easy to maintain. 5. Use trees to provide shade in outdoor spaces. 6. Keep water on or at the surface where practical.
Biodiversity	1. Recreate historic runway alignment.

	2. Enhance tree numbers. 3. Contribute to habitat connectivity through green corridors and links to habitat areas. 4. Use a range of wet and ephemeral SuDS components to encourage more diverse and resilient ecosystems.

3.3. Step 3: Identify feasible points of discharge

3.3.1. As discussed, there is strong evidence to suggest that surface water can be drained on Site via infiltration. This will remove the need for external connection points to existing sewers; furthermore, there are no watercourses within reasonable distance to the Site to which discharge could take place.

3.3.2. In the case that infiltration is proved unfeasible for whatever reason, a connection to the existing surface water network serving the adjacent areas would need to be explored and capacity checks undertaken.

3.3.3. Foul water for the Northern Site will likely discharge to the existing Anglian Water sewer to the west of the Site. Manhole numbers 1602 and 1802 would be potential locations. For the Southern Site, a potential connection could be made to the foul water sewer on the southern boundary, at chambers such as 5602, 6602, or 6601, among others. A connection could also be made to the foul water sewer within Maidstone Road.

3.3.4. The proposed points of discharge are presented graphically in Appendix 5.

3.4. Step 4: Define Surface Water Sub-catchments and Flow Routes

3.4.1. The proposed networks will best mimic the existing topography of the Site. In particular, on the Northern Site, the green/blue corridor running north-west along the alignment of runway 16/34. For both sites, on an individual level, units will be isolated from one another by the access roads on the development and drained into surface storage solutions or voided permeable paving where possible. Overland flow routes will be routed into the main arterial connection roads and into attenuation features and infiltration devices.

3.4.2. In the instance that the SuDS features are not able to remove the surface water from Site, or are not functioning correctly, exceedance routing for the Northern Site will be directed overland towards Laker Road to the west where it will flow north and eventually join the River Medway. For the Southern Site exceedance routing should direct surface water away from the built up areas of the Site into the areas of low risk soft landscaping.

3.4.3. The proposed surface water sub-catchment and flow routes is presented graphically in Appendix 5.

3.5. Step 5: Select SuDS components for the Management Train

Strategic SuDS Network

3.5.1. The Northern Site will be split into four separately draining parcels, 1, 2, 3, and 4, as shown in Appendix 5. Each of these parcels will be drained through its own SuDS system and infiltration points. In the case of phasing and ownership issues, this will ensure that no parcel is dependent on the other for downstream drainage.

3.5.2. The Southern Site will be drained as a single parcel via infiltration.

3.5.3. The proposed surface water drainage strategy adopts a Strategic SuDS Network comprising of a series of above ground open blue/green features and below ground attenuation storage in the form of permeable paving and tree pits.

3.5.4. The south-to-north blue/green corridor following the alignment of runway 16/34 forms part of the Strategic SuDS Network. Permeable paving in car parking areas will provide primary treatment and storage while tree pits will be employed to drain the main highways and access roads. The green/blue corridor will be used to convey water from the Site to infiltration devices in the north whilst also providing secondary treatment.

3.5.5. Additionally, the green/blue corridor will provide storage for the Site runoff in the 100 year storm event plus climate change. This storage will be in the form of a series of small natural-looking attenuation basins linked by a shallow swale or by a single, long swale linking the inflow locations to the discharge points.

3.5.6. The exact volume and dimensions of the green/blue corridor will be determined following input from the architect/landscape consultant.

3.5.7. The final outfalls will be to soakaways within each parcel, placed within the permeable strata (subject to site investigation and in situ infiltration testing).

3.5.8. Surface water runoff from business units should receive a minimum of one-stage of treatment before discharging to the strategic SuDS network. The Strategic SuDS Network will provide the final water polishing, ensuring surface water is suitable for discharge to the ground.

3.5.9. The biodiversity and amenity value of SuDS features should be maximised.

Selection of SuDS components

Table 2.4: Selection of SuDS Components

Category		Component
Water quantity	Runoff collection	Standard roof downpipes to rainwater harvesting systems. To be stored within roof void of units where possible to maximise space in parking areas for permeable paving. Interception by green roof systems, discharging via standard roof downpipes to the surface water drainage system. Direct rainfall collection by permeable pavement or lateral inflows from impermeable surfaces. Roads to drain via gullies to tree pits where possible. Surface water runoff to be conveyed to attenuation and infiltration features, via the green corridor in parcels 1 and 2.
	Interception	5mm interception depth, compliance for 80% of rainfall events during summer months and 50% during winter. Infiltration and permeable pavements, provided no additional area drains to the lined system. Interception directly through tree foliage and other vegetation.

		Soil storage, infiltration, evapotranspiration in green/blue corridor.
	Storage	Soakaways (1:10 year minimum). Other components (1:30 year minimum, 1:100 if practicable).
	Conveyance	Piped conveyance or swale/swale with underdrainage to convey runoff to downstream components.
	Exceedance	Further storage in soft landscaping, low risk areas, and within tree pits; in parcels 1 and 2, this is to be provided primarily in the green corridor. Land profiling/raised kerbs allowing extra storage and conveyance above parking areas and roads. Overland Strategic SuDS Network.
Water quality	Discharges to groundwater	Business unit roofs: Pollution hazard level - low. Hazard indices: TSS 0.3, metals: 0.2, HCs: 0.05 Access roads and non-residential car parking with infrequent change: Pollution hazard level - low. Hazard indices: TSS 0.5, metals: 0.4, HCs: 0.4 Commercial yard and delivery areas: Pollution hazard level – medium. Hazard indices: TSS 0.7, metals: 0.6, HCs: 0.7
	Discharges to surface water	No discharge to surface water.
	Ground water protection measures	In all areas, an index approach to SuDS management chain should be utilised to ensure sufficient mitigation of pollution indices. Ground water protection is also to be provided in accordance with the requirements of the appropriate source protection zone, as defined by the Environment Agency.
Amenity	Trees and bio-retention planting to deliver multi-functional and high amenity space to plot frontages and roads. Selected planting to basins, swales and biodiversity areas to improve amenity value. Green space on Site, seating for users along the proposed *Runway Park* in parcel 1, and in the *Orchard Cluster*[9] in parcel 2.	
Biodiversity	Trees and bio-retention planting provide ecological corridors and valuable habitat for a range of species. Selected planting to parking courts, swales and biodiversity areas to maximise biodiversity delivery. Dry grass areas and wetlands provide varied biodiversity.	

3.6. Step 6: Optimise Management Train

[9] LDA Design (May 2018) *Innovation Park Medway Client Progress Meeting*

3.6.1. The development masterplan has been reviewed against the design criteria to ensure that the benefits are maximised, sufficient space is available for the implementation of the chosen SuDS components, and the required offsets from building footprints is achievable.

3.6.2. The proposed SuDS components management train, control points and exceedance routes are presented graphically in Appendix 5; the sketches effectively illustrate the proposed Strategic SuDS Network.

3.6.3. The strategy aims to retain surface water at the point of incidence, before releasing it at a restricted rate through the subsequent conveyance and attenuation features. It is then carried to the infiltration points located across the Site where it is discharged to the ground.

3.6.4. There is potential to use green spaces across the Site, such as the green corridor, to accommodate surface water within low risk areas of controlled flow exceedance; this offers the opportunity to reduce/limit the size of SuDS features and provide a more efficient and effective system for the majority of storm events.

4.0 STAGE 3: OUTLINE DESIGN

4.1. Estimate Allowable Peak Site Discharge Rates

4.1.1. The Site is 18.65 hectares. It is assumed that 80% of the Site area is occupied by impervious surfacing. A summary of the Site areas is contained in Table 3.2 below.

Table 3.1: Impervious/Pervious Areas Considered

Description	Site Area (ha)	Impervious Area (ha); taken as 80% of Site Area	Pervious Area (ha); taken as 20% of Site Area
Parcel 1	3.54	2.83	0.71
Parcel 2	4.82	3.86	0.96
Parcel 3	4.50	3.60	0.90
Parcel 4	2.56	2.05	0.51
Parcel 5	3.23	2.58	0.65
Total	18.65	14.92	3.73

4.1.2. The greenfield runoff rates for the Site have been calculated using the ReFH2 method and are shown in Table 4.2 and Table 4.3 below. The calculation of the greenfield runoff rate can be found in Appendix 6.

Table 4.2: Greenfield Runoff Rates for the Site and per Hectare

Annual rainfall Event	Greenfield Runoff Rate (litres/sec)	Site Area (ha)	Greenfield Runoff Rate (litres/sec/ha)
1 in 1 Year	= 48.5	/ 18.65	= 2.6
1 in 30 Year	= 129.3	/ 18.65	= 6.9
1 in 100 Year	= 187.4	/ 18.65	= 10.0
QMed	= 53.7	/ 18.65	= 2.9
QBar	= 56.7	/ 18.65	= 3.0
In in-line with Section 6.2.2 of the Environment Agency Report – SC030219, QMed to QBar conversion factor = 0.9			

Table 4.3: Greenfield Runoff Rates for the Developable Area

		Greenfield Runoff Rate (litres/sec/ha)			Greenfield Runoff Rate (litres/sec)		
Parcel	Area (ha)	1:1 yr	1:30yr	1:100yr	1:1 yr	1:30yr	1:100yr
1	3.54	2.6	6.9	10.0	9.2	24.5	35.6
2	4.82	2.6	6.9	10.0	12.5	33.4	48.4
3	4.50	2.6	6.9	10.0	11.7	31.3	45.2
4	2.56	2.6	6.9	10.0	6.7	17.7	25.7
5	3.23	2.6	6.9	10.0	8.4	22.4	32.5
Total	18.65	-	-	-	48.5	129.3	187.4

4.1.3. The standard adopted for the Site is that all surface water runoff for the Site is to be discharged via infiltration to ground. Therefore, the proposed runoff rates from the Proposed Development will be 0 litres/sec for all Parcels.

Table 3.4: Proposed Runoff Rates for the Developable Area

		Proposed Runoff Rate (litres/sec/ha)		
Parcel	Area (ha)	1:1 yr	1:30yr	1:100yr
1	3.54	0	0	0
2	4.82	0	0	0
3	4.50	0	0	0
4	2.56	0	0	0
5	3.23	0	0	0
Total	18.65	0	0	0

4.2. Estimate Attenuation Storage Volumes and Infiltration Requirements

4.2.1. The Strategic SuDS Network comprises a series of blue/green features with an eventual discharge to ground at a number of locations. The total discharge rate from the Site will therefore be restricted by the proposed infiltration features present on Site; it will not be limited by the greenfield runoff rates presented above. The total required volume for the Strategic SuDS Network has been found by creating a representative model of each parcel to find the infiltration requirements and subsequently the associated storage; the results of this can be found on Drawing 5505 in Appendix 7.

4.3. Check Flow Control Points and Exceedance Flow Routes

4.3.1. Flow control will be carried out across the Site at discharge points from attenuation devices. This will be done to store surface water runoff high up in the system, as close to the point of incidence as is feasible, before releasing the runoff to the infiltration devices at a manageable rate. The conveyance routes and general surfacing of the Site will be designed to control exceedance flows to low risk areas of soft landscaping. In the event of significant exceedance in the Northern Site, overland flow will be directed to the proposed road network, and towards Laker Road, mimicking the existing overland flow routes. These routes will be as proposed in Appendix 5.

4.4. Define Proposed Outline Drainage Strategy

4.4.1. Following the outline set out on the SuDS sketches found in Appendix 5 a proposed outline drainage strategy has been defined; this sets out the key SuDS features required to provide the necessary attenuation, conveyance and treatment of surface water runoff. This must be expanded further during detailed design of the Site.

5.0 CONCLUSIONS

5.1.1. CampbellReith has been commissioned to prepare a Sustainable Drainage Strategy to support the Outline Planning Application for the Proposed Development of the Innovation Park Medway at Rochester Airport.

5.1.2. A robust surface water drainage strategy has been outlined in line with best practice and local policies to help mitigate the risk of surface water flooding both on-site and off-site. The proposed drainage strategy provides opportunities to utilise a variety of SuDS components, and which has the potential to satisfy all four pillars of SuDS design through controlling water quantity, improving water quality, encouraging biodiversity and offering amenity value.

5.1.3. The proposed drainage system is to discharge to ground via infiltration. An infiltration rate of $1.0x10^{-4}$ m/sec has been used in design.

5.1.4. The developable area of the Site has been split into various sub-catchments to segregate areas of the development and allow the development of Parcels individually.

5.1.5. The Strategic SuDS Network for the Proposed Development is designed to convey and store surface water from Site for all storms up to and including the 1 in 30 year storm event within the proposed SuDS features, without flooding adjoining spaces. The 1 in 30 year to 1 in 100 year storm including a 40% climate change will be managed by controlling flow exceedance and containing it within areas of soft/hard landscaping and the proposed green corridors; in the event of greater events, overland flow routes off site will be maintained as existing, discharging to Laker Road, and subsequently to the Medway.

5.1.6. The total required volume of attenuation for the Strategic SuDS Network is presented in the tables on Drawing 5050 in Appendix 7; the total attenuation volume for the Site is $6891m^3$ for the 1 in 30 year event, and $14790m^3$ for the 1 in 100 year event.

5.1.7. The design is suitably conservative and water quality from the Parcels will be sufficiently improved before discharge to the ground.

5.1.8. Detailed design of the Proposed Development must considers storm exceedance where overland flow is managed and directed away from buildings to soft landscaped areas, used as temporary storage areas, providing a safe means of access and egress for the individual development catchments.

5.1.9. Further to this report, the detailed design of the Strategic SuDS Network will be required to build on the proposed design philosophy and move into the detailed design phase.

Appendix 1: Site Location Plan

Innovation Park, Medway

Client: Medway Council

Figure 1:
Site Location Plan

Scale: 1:50000@A4
CampbellReith OS Copyright: © Crown copyright. All rights reserved. Licence number 100020027
Contains Ordnance Survey data © Crown copyright and database right 2018.
Job Number: 12841
Drawn by - Checked by: RP/RLF - SB
Drg No - Status/Revision: GIS002 - B
File location: //red-data1/gis-data/12750 - 12999/12841 R - Medway/Project_Workspaces (pdf in Outputs)
Date (Revision History): 14/08/2018 (A, First Issue, 03/05/18, RP; B, Minor Amendments, 14/08/18, RLF)

CampbellReith
consulting engineers
LONDON 020 7340 1700 ☐ ☐ MANCHESTER 0161 819 3060
REDHILL 01737 784 500 ☒ ☐ BIRMINGHAM 01675 467 484
BRISTOL 0117 916 1066 ☐ ☐ DUBAI 00 971 4453 4735
www.campbellreith.com

Appendix 2: Illustrative Masterplan


Draft
Masterplan
0
100m
200m

Appendix 3: CR Flood Risk Assessment

CampbellReith
consulting engineers

Confidential

Innovation Park, Medway

Flood Risk Assessment

For

INNOVATION PARK MEDWAY

Project Number:

12841

August 2018

Campbell Reith Hill LLP
Raven House
29 Linkfield Lane
Surrey
RH1 1SS

T: +44(0)1737 784500
F: +44(0)1737 784501
E: surrey@campbellreith.com
W: www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	27.08.2018	For Information	AHah-12841-270818-MedwayFRA-D1.docx	AH	SRB	SRB
F1	31.08.2018	For Information	See below	AH	SRB	SRB

Document Details

Last saved	26/08/2018 16:22
Path	AHah-12841-310818-MedwayFRA-F1.docx
Author	AHoy
Project Partner	SBoots
Project Number	12841
Project Name	Innovation Park, Medway

Contents

Appendices

Tables

Figures

EXECUTIVE SUMMARY

CampbellReith have prepared on behalf of Innovation Park Medway, a FRA for the proposed development at Rochester Airport, written in accordance with the National Planning Policy Framework (NPPF).

The site is located at Rochester Aiport, Chatham MR5 9SD and sits within two local authorities, Medway Council (MC) and Tonbridge and Malling Borough Council (TMBC). The site boundary is split into two portions; the northern area which forms part of Rochester Airport runways and the southern area which forms a caravan park.

A Local Development Order (LDO) is being submitted for a scheme that will deliver a high quality innovation park with flexible plots to encourage a wide range of high-value technology, engineering, manufacturing and knowledge-intensive businesses.

This FRA aims to identify the sources of flooding related to the Proposed Development and demonstrates how residual flood risks will be managed.

The site is located within a Flood Zone 1 and is therefore at low risk from fluvial and tidal sources.

The site is underlain with Seaford Chalk Formation and has an expected infiltration rate of 0.036m/hr. No groundwater flooding has been recorded within the MBC or TMBC therefore the risk is expected to be low for the site. Further ground investigation and infiltration testing will confirm this conclusion.

The risk of sewer flooding to the site is deemed to be low. A preliminary enquiry to Southern Water should be undertaken for the proposed development.

The EA flood maps consider the risk of reservoir flooding to be low.

The majority of the site is considered by the EA to be at very low risk of sur face water flooding. An overland flow path has been identified as medium-high risk at the north most boundary of the northern area flowing towards Laker Road before heading north. This flow path should be maintained to minimise the risk of surface water flooding on-site. A small area at low-medium risk has been identified on the southern area as a result of the existing site use and topography. The proposed surface water drainage strategy will mitigate this risk of flooding on-site.

The proposed surface water drainage strategy is summarised in this report and discussed in detail in the accompanying drainage report. The northern and southern areas have been addressed separately and have been split further into parcels. Each parcel is to be served by its own surface water drainage network connected to dedicated soakaway features at strategic locations within each parcel. The preferred SuDS features are subject to architect's layouts but could include swales, dry basins, permeable paving, tree pits and cellular storage. The residual risk of surface water flow during exceedance events of 1 in 100 + 40% climate change will be managed through controlled flooding to assigned soft and hard landscaped areas.

It is concluded that the development proposals of the site is in accordance with both National and Local Planning Policies and based on the information provided by CampbellReith within this FRA are considered sustainable and acceptable in terms of flood risk.

1.0 INTRODUCTION

1.1. Brief

1.1.1. CampbellReith have been commissioned on behalf of Innovation Park Medway to prepare a Flood Risk Assessment (FRA) in accordance with the National Planning Policy Framework (NPPF) (2018) for the proposed development at Rochester Airport, Chatham, ME5 9SD; herein referred to as the site.

1.1.2. The site sits within two local authority boundaries; Medway Council (MC) and Tonbridge and Malling Borough Council (TMBC). This FRA has considered planning policy applicable to both authorities within this assessment.

1.2. Proposed Development

1.2.1. The Client is submitting an application for a Local Development Order to both Medway Council (MC) and Tonbridge and Malling Borough Council (TMBC). Kent County Council (KCC) are the Lead Local Flood Authority (LLFA) for the area.

1.2.2. The masterplan contained in **Appendix A** outlines a scheme that will deliver a high quality innovation park with flexible plots to encourage a wide range of high-value technology, engineering, manufacturing and knowledge-intensive businesses. This class of use is considered as 'Less Vulnerable' according to the Environment Agency (EA).

1.3. Aims and Objectives

1.3.1. The FRA aims to identify the sources of flooding related to the Proposed Development and demonstrates how residual flood risks will be managed.

1.3.2. In accordance with the NPPF and online Planning Practice Guidance (PPG) a FRA is required for sites which are greater than a hectare and located within a Flood Zone 1.

1.3.3. The objectives of this FRA are to establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source;
- Whether it will increase flood risk elsewhere;
- Whether the measures proposed to deal with these effects and risks are appropriate;
- The evidence to satisfy the Local Planning Authority's (LPA) (if necessary) Sequential Test, and;
- Whether the development will be safe and pass the Exception Test, if applicable.

2.0 PLANNING POLICY AND LOCAL LEGISLATION

2.1. National Planning Policy Framework (NPPF) (2018)

2.1.1. The National Planning Policy was recently updated in August 2018. The NPPF sets out the government's national planning policies to protect people and property from flooding from either now or in the future which all local panning authorities are expected to follow. There are three main steps which should be followed to ensure that the risk of flooding from development is minimised; assess the flood risk, avoid flood risk and manage and mitigate the flood risk.

2.1.2. The NPPF recommends new development to adopt a sequential, flood risk-based approach to the location of development, taking into account climate change and its impact now and for the future to avoid any possible flood risk. The aim of the sequential test is to steer development to areas considered to be at the lowest risk from sources of flooding. If this is not possible then the exception test would be required demonstrating that the development would provide wider sustainability benefits to the community that would outweigh the flood risk and that the development would be safe for its lifetime taking into account the vulnerability of the users without increasing flood risk elsewhere and where possible reducing the current risk of flooding.

2.1.3. The NPPF also states that major developments should incorporate sustainable drainage systems (SUDS) unless there is clear evidence that this would be inappropriate.

2.2. Planning Practice Guidance

2.2.1. The proposed development falls into the 'industrial and commercial use' category and is assigned a status of 'less vulnerable'. The PPG's '*Table 3: Flood risk vulnerability and flood zone 'compatibility'* [1] details what level of vulnerability is considered compatible and therefore acceptable within each Flood Zone.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Figure 2.1: Environment Agency Table 3: Flood risk vulnerability and flood zone compatibility

[1] Environment Agency (2014) Flood Zone and Vulnerability Classification https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification

2.3. Medway Council Local Plan

2.3.1. MBC are currently working on their local plan for the period up to 2035. This new Local Plan (2012-2035) will eventually replace the MBC 2003 Local Plan, which is understood to be implemented by 2020.

2.3.2. MBC Local Plan 2012-2035 Policy EN7 is applicable to Flood and Water Management. The policies ensures the Local Plan will seek to reduce flood risk, promote water efficiency measures, and protect water quality through flood risk management and sustainable urban drainage.

2.3.3. The MBC 2003 Local Plan's Policies FR1-6 were applicable to Flood Risk. The policies outline the requirements of flood risk and development and state that proposals for development should be accompanied by a flood risk assessment. The existing policy also suggests that where proposals are likely to increase the amount of runoff as a result of the development, the development will only be permitted where effective preventative measures are incorporated and surface water runoff is managed.

2.4. Tonbridge and Malling Borough Council Local Development Framework (2007)

2.4.1. Policy CP10 relates to flood risk and development. The policy states

> *Within the floodplain development should first seek to make use of areas at no to low risk of flooding before areas at higher risk, where this is possible and compatible with other policies aimed at achieving sustainable development.*

2.5. Kent County Council (KCC) Sustainable Drainage

2.5.1. Kent County Council are the LLFA for the area and have issued "Water. People. Places." Which is a guide intended for developers when masterplanning sustainable drainage into major development. The document was prepared by the LLFAs of the South East and has been used to inform the proposed surface water drainage strategy for the proposed development.

2.6. Local Guidance

2.6.1. The following sources have been referenced when carrying out this FRA:

- MBC Strategic Flood Risk Assessment (2006)
- MBC Surface Water Management Plan (2016)
- MBC Preliminary Flood Risk Assessment (2011)
- TMBC Strategic Flood Risk Assessment (2016)

3.0 SITE CONTEXT

3.1. Site Area

3.1.1. The site is split into 2 separate areas, to the north and to the south of the existing airfield site. Overall, the site area is 18.36 Hectares (Ha). Rochester Airport is a general aviation aerodrome on the boundary of Medway Council and Tonbridge and Malling Borough Council. The airport has been used since the early 20th century.

3.1.2. The Northern Area consists of two distinct parcels.

- The main parcel (*Parcel 1*) comprises the airfield occupied by part of the runway 16/34, which is laid to well-maintained grass.
- The second parcel (Parcel 2) is currently occupied by BAE systems. It is laid to concrete slabs as a car park area and secured by palisade fence

3.2. The Southern Area also consists of two distinct parcels:

- The eastern parcel, (*Parcel 3*), has concrete remnants of structures that have been previously demolished on the site. Part of the site is currently being used as an overflow parking for the Innovation Centre, to the north. Within the Parcel 3 is a single storey brick structure and fenced compound. It is thought that both are related to utilities supplies within the site and the wider area.
- The western parcel (Parcel 4), is the site of the Woolmans Wood Caravan Park. The site is currently operational as a caravan park and has space for approximately 100-125 Caravans.

3.3. Site Ownership

3.3.1. Medway Council owns the majority of the site with two leasholders on the site, Rochester Airport Ltd (RAL) and BAE Systems. Although parcels 1, 2 and 3 are owned by Medway Council, a small area of the site falls within the boundary of Tonbridge and Malling Borough Council. Parcel 4, the site of Woolmans Wood Caravan Park to the south west of the Innovation Centre Medway, is privately owned.

3.4. Site Surroundings

3.4.1. To the north of the northern area, the site is bounded by buildings occupied by BAE systems. These comprise a mixture of industrial sheds and office accommodation. To the north west is the Rochester Airport Industrial Estate with a variety of building types including office and industrial. To the west is the Laker Road Industrial Estate comprising a variety of varying office and industrial/manufacturing uses. To the east is the retained Rochester Airport Site. The M2 is located to the west, adjacent to the Kent Downs Area of Outstanding Natural Beauty.

3.4.2. To the north of the southern area, the site is bounded by the existing Innovation Centre owned by Medway Council. The site is bounded by the B2097 to the west and the A229 to the east. To the north west is the retained Rochester Airport site and, to the south, the site is bounded by existing residential developments.

3.5. Topography

3.5.1. The existing site is relatively flat with Levels Above Ordnance Datum (AOD) being between 127m AOD in the south, and 120 AOD in the north.

3.5.2. Significant gradients are absent from all land parcels, with the only variation being the level of surface cover as a result of previous use. There are localised areas of uneven ground on the southern area due to previous demolition and remnant material.

3.5.3. The topography of Parcel 1 and 2 is predominantly flat with falls of approximately 1:80 from south to the north.

3.6. Ground Conditions

3.6.1. The British Geological Survey (BGS) geology viewer of the area shows the bedrock of the site to be the Seaford Chalk Formation, described as a firm, white chalk with nodular and tabular flint seams. Hard lithified strata and thin marls are known to be present within the lower beds of the formation. Flint nodules are noted to be large to very large in size. Superficial deposits of the Clay with Flints Formation are recorded to overlay the Chalk, described broadly as unbedded and heterogeneous orange to brown and red to brown sandy Clays.

3.6.2. Nearby boreholes, accessed through the online BGS borehole archive, indicate a layer of turf over topsoil up to 0.1m bgl, underlain by Made Ground up to 0.45-0.60m bgl. Variable Clay deposits (Clay with Flints Formation) are recorded beneath the Made Ground up to 2.20m bgl, in turn underlain by variable Chalks (Seaford Chalk Formation) encountered up to hole completion (4.6m bgl).

3.7. Hydrology

3.7.1. There are no surface water features or EA Main Rivers located within the site boundary. The River Medway runs west-east approximately 2.5km to the north of the site.[2].

3.7.2. Currently, all surface water on the developed site drains via infiltration, while overland flow discharges to the west onto Laker Road.

3.8. Hydrogeology

3.8.1. The superficial deposits contained within the site are assessed as being unproductive strata. The soil/bedrock deposits of the Seafor Chalk Formation are considered a Principal Aquifer. The groundwater vulnerability map shows the whole site to be classed as a 'major aquifer high'.

3.8.2. A Source Protection Zone 2 (Outer Catchment (Area B) and Source Protection Zone 3 (Total Catchment (Area B) are present on site.

3.8.3. Two groundwater abstraction licenses have been recorded 513m east of the site and 697m west of the site.

3.9. Existing Drainage

[2] Environment Agency Main River Map https://environment.maps.arcgis.com

3.10. Currently, all surface water on the site drains via infiltration, while overland flow discharges to the west onto Laker Road. Other than the private airport network there are no surface water sewers on the existing site.

3.11. A historic drainage strategy, compiled in 2014, derived an infiltration rate of 19.8m/hr (5.5 x10^{-3} /sec) from a back-analysis of the existing drainage. The exact infiltration rate of the existing geology is subject to confirmation.

3.12. Southern Water are the incumbent sewerage provider for the area. The local asset plans are contained in **Appendix B.** A Southern Water foul sewer running parallel to the site is present in Laker Road.

3.13. The greenfield runoff rates for the site have been calculated using the ReFH2 method and are shown in Table 3.1.

Table 3.1: Greenfield Runoff Rates

Annual rainfall Event	Greenfield Runoff Rate (litres/sec)	Site Area (h	Greenfield Runoff Rate (litres/sec/ha)
1 in 1 Year	48.5	/18.65	2.6
1 in 30 Year	129.3	/18.65	6.9
1 in 100 Year	187.4	/18.65	10.0
QMed	53.7	/18.65	2.9
QBar	56.7	/18.65	3.0
In in-line with Section 6.2.2 of the Environment Agency Report – SC030219, QMed to QBar conversion factor = 0.9			

4.0 ASSESSMENT OF EXISTING FLOOD RISK TO THE SITE

4.1. Flood Zones

4.1.1. The EA define[3] Flood Zones from rivers or the sea as follows:

- Flood Zone 1 (Low Probability): Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3).
- Flood Zone 2 (Medium Probability): Land having between a 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map).
- Flood Zone 3a (High Probability): Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown n dark blue on the Flood Map).
- Flood Zone 3b (The Functional Floodplain): This zone comprises land where water has to flow or be stored in times of flood. Local Planning Authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Flood Zone 3a on the Flood Map).

4.2. Fluvial Flooding

4.2.1. The River Medway is located approximately 2.5km north and the site is located within a Flood Zone 1 denoting a low risk to the site, see **Figure 4.1**. The TMBC climate change map confirms the site is not at future risk due to climate change from the River Medway.

4.3. Tidal Flooding

4.3.1. There are no known coastal sources of flood risk on or adjacent to the site; the risk of tidal flooding is therefore low.

[3] Environment Agency & DEFRA (2014) Flood Zone Definition: https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

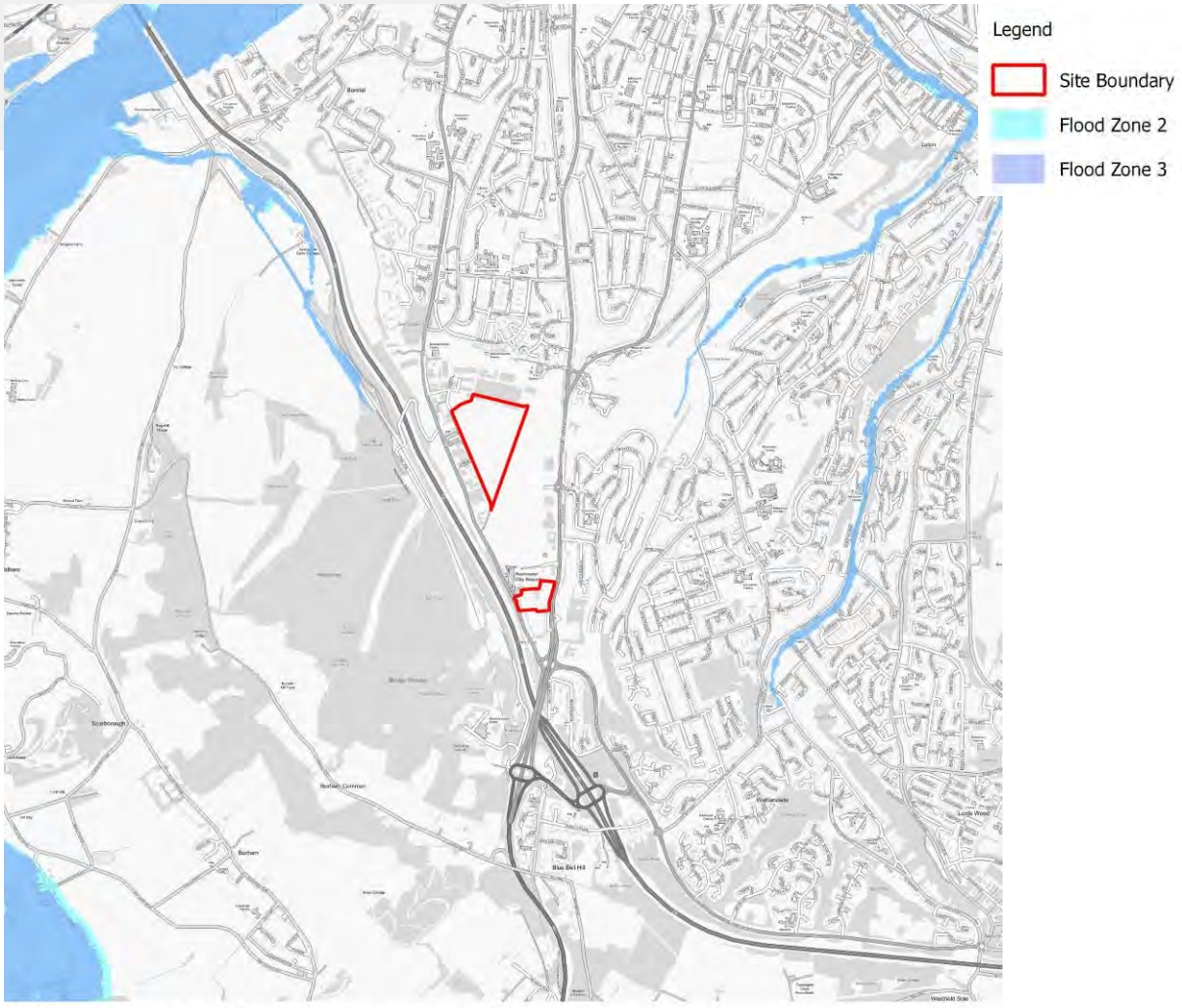

Figure 4.1: Environment Agency Flood Zone Map for Planning

4.4. Surface Water Flooding

4.4.1. The EA classify surface water flood risk as follows:

- VERY LOW – the area has a chance of surface water flooding of less than 0.1%
- LOW – the area has a chance of surface water flooding of between 0.1% and 1%
- MEDIUM – the area has a chance of surface water flooding of between 1% and3.3%
- HIGH - the area has a chance of surface water flooding of greater than 3.3%

4.4.1. The EA's Updated Flood Map for Surface Water (UFMfSW) is shown in **Figure 4.2**. The majority of the northern area is at very low risk of surface water flooding. Small areas towards the northmost boundary, south of the existing buildings are at low-medium risk of surface water flooding. An overland flow route of low-medium-high risk, at the north western boundary of the site flows towards Lake Road.

4.4.2. The majority of the southern area is considered very low risk in terms of surface water flooding. Towards the north eastern boundary of the southern area, the site exhibits areas of low-medium risk of surface water flooding, the direction of this overland flow path heads north.

4.4.3. The proposed development will increase the amount of impermeable area on site and as a result will increase the volume of runoff and rate of runoff from the site. In order to mitigate this risk and negate an increase in risk off-site the management of surface water has been discussed in Section 5.0.

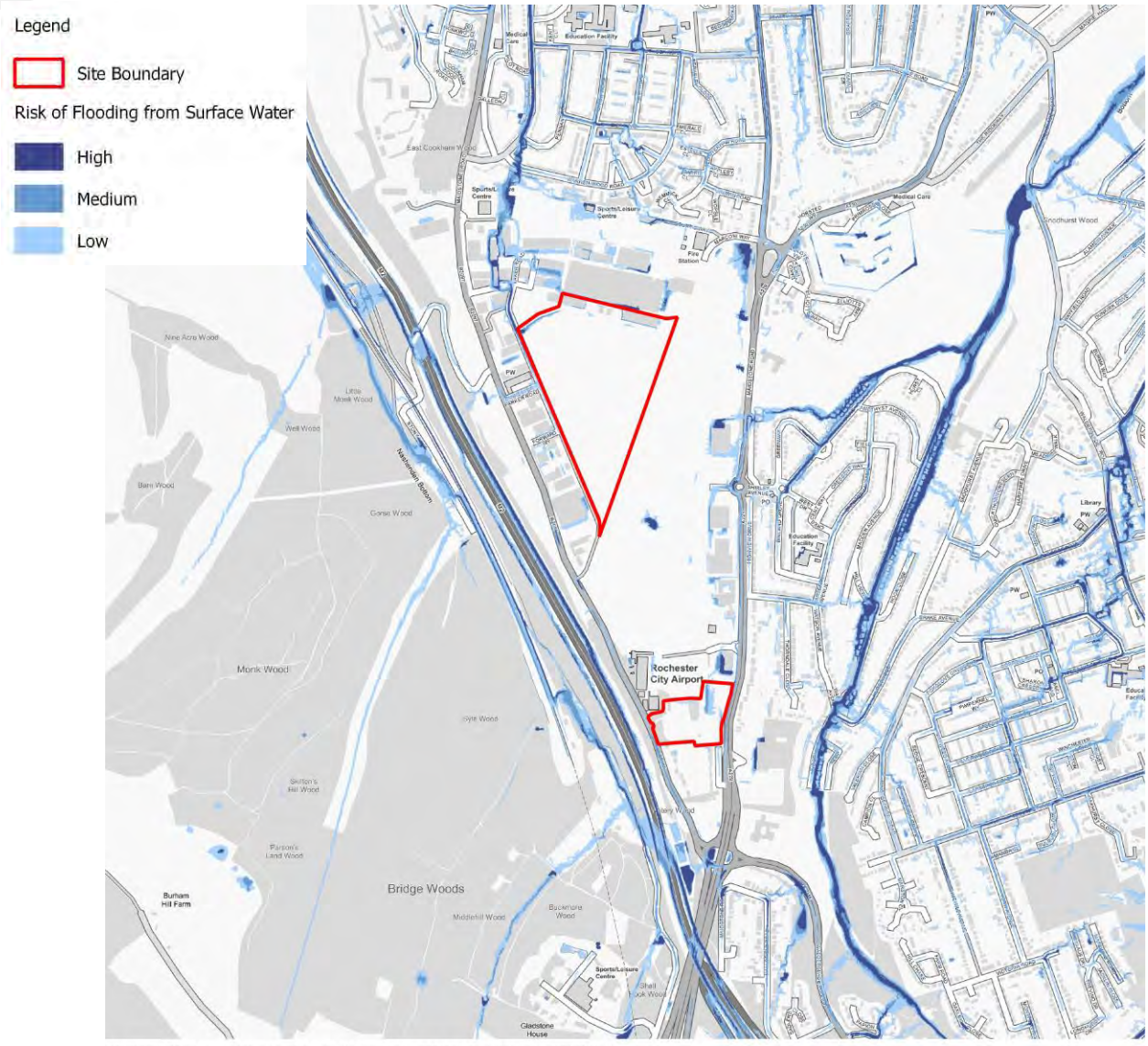

Figure 4.2: Environment Agency Updated Flood Map for Surface Water Flooding

4.5. Groundwater Flooding

4.5.1. A review of the MBC and TMBC SFRA's confirm the risk of groundwater flooding for the site and the surrounding area is low. There has been no recorded groundwater flooding in the past and due to the relatively elevated location of the site in comparison to the surrounding area, groundwater is not considered to be a risk.

4.5.2. Based on the information available from MBC and TMBC, the risk of groundwater flooding is considered to be low.

4.6. Sewer Flooding

4.6.1. A review of the MCB and TMBC SFRAs suggest the risk of sewer flooding to the site is low. Due to the existing nature of the site the risk of existing sewer flood risk is further reduced.

4.6.2. A preliminary inquiry to Southern Water is required to confirm this low risk of sewer flooding.

4.7. Flooding from Reservoirs

4.7.1. The EA flood risk from reservoirs flood map suggests the site is at low risk of flooding from reservoirs.

5.0 SURFACE WATER MANAGEMENT

5.1. Overview

5.1.1. A Surface Water Drainage Strategy has been prepared by CampbellReith and has been submitted as part of this planning application. The surface water drainage strategy is written in accordance with the CIRIA SuDS Manual, Best Practice and the KCC's "Water. People. Places. Guidance".

5.1.2. This section of the FRA summaries the report and outlines how surface water runoff will be managed for the northern area and southern area of the proposed development. The drainage strategy masterplan is contained in **Appendix C.**

5.2. Proposed Impermeable and Permeable Areas

Northern Area

5.2.1. The northern area drainage strategy has been split into four catchments, see **Figure 5.1.**

Figure 5.1: Drainage catchments of the northern area

5.2.2. The permeable and impermeable areas have been estimated based on an assumption of 20% and 80% respectively, see Table 5.1.

Table 5.1: Northern Area impermeable and permeable areas & generated surface water volume

Parcel	Site Area (m^2)	Assumption	
		20% permeable (m^2)	80% Impermeable (m^2)
1	35,377	7,075	28,302
2	48,155	9,631	38,524
3	45,045	9,009	36,036
4	25,637	5,127	20,510

Southern Area

5.2.3. The southern area is split into one catchment. The impermeable and permeable areas assigned to each catchment is shown in Table 5.2.

Table 5.2: Southern Area impermeable and permeable areas & generated surface water volume

Parcel	Site Area (m^2)	Assumption	
		20% permeable (m^2)	80% Impermeable (m^2)
1	32,300	6,460	25,840

5.3. Surface Water Volume Attenuation

5.3.1. Based on the outputs of Table 5.1 and 5.2, the volume of surface water generated by the proposed development has been calculated and shown in Table 5.5 and 5.6 below. The volumes requiring attenuation have been based on 1 in 100 + 40% climate change allowance.

Northern Area

Table 5.3: Surface water volume generated from northern area (1 in 100 + 40% climate change)

Parcel	Volume of surface water generated by the proposed development (m^3)
1	3,521
2	4,793
3	4,484
4	2,552

Southern Area

Table 5.4: Surface water volume generated from southern area (1 in 100 + 40% climate change)

Parcel	Volume of surface water generated by the proposed development (m^3)
1	2,575

5.4. Long-term Storage Volume Estimate

5.4.1. The aim of long-term storage is to mitigate the impact of the additional volume of surface water runoff from the proposed development on the receiving surface water bodies. By restricting the total discharge rate from the site to greenfield runoff for the 1 year storm and QBar for all other storms up to and including the 1 in 100 year climate change storm (40% increase in peak rainfall intensities) the long-term storage requirements are satisfied in accordance with best practice guidance

5.5. Sustainable Urban Drainage Systems (SuDS)

5.5.1. The proposed surface water drainage strategy adopts a Strategic SuDS Network comprising of a series of above ground open blue/green features and below ground attenuation storage in the form of permeable pacing and tree pits.

5.5.2. In line with the SuDS hierarchy, infiltration is the preferred method of surface water disposal. The estimated infiltration rate for the site based on the assumed geology and nearby infiltration testing is 0.036m/hr. Further infiltration testing is required to confirm the expected rates and confirm whether infiltration SuDS are suitable for the site. The proposed strategy also puts forward a Strategic SuDS Network satisfying the four pillars of SuDS design through controlling water quantity, improving water quality, encouraging biodiversity and offering amenity value.

5.5.3. Each parcel is to be served by its own surface water drainage network connected to dedicated soakaway features at strategic locations within each parcel. The possible SuDS features considered although are subject to the architects layout, are:

- Swales
- Dry Basins
- Permeable Paving
- Tree Pits
- Cellular Storage

5.5.4. The surface water drainage strategy also puts forward options for managing the exceedance volumes during a 1 in 100 (+40% climate change) critical storm event.

5.5.5. The accompanying Surface Water Drainage Strategy discusses the management of surface water in more detail. This chapter summarises the report and shows that the additional volume of water can be accommodate for within the Masterplan now and for the future without increasing the risk of flooding off-site. The proposed strategy is subject to confirmation and acceptance from the Lead Local Flood Authority (LLFA).

6.0 CONCLUSIONS

6.1.1. CampbellReith have prepared this FRA to show the proposed development at Innovation Park Medway in accordance with the NPPF.

6.1.2. The site is located within a Flood Zone 1 and therefore considered to be at low risk from fluvial flooding.

6.1.3. The site is not situated near any tidal sources and is deemed to be at low risk from tidal flooding.

6.1.4. The site is underlain with Seaford Chalk Formation and has an expected infiltration rate of 0.036m/hr. No groundwater flooding has been recorded within the MBC or TMBC therefore the risk is expected to be low for the site. Further ground investigation and infiltration testing will confirm this conclusion.

6.1.5. The risk of sewer flooding to the site is deemed to be low. A preliminary enquiry to Southern Water should be undertaken for the proposed development.

6.1.6. The risk of reservoir flooding is considered to be low.

6.1.7. The majority of the northern and southern areas of the site are at very low risk from surface water flooding. A small area at the north most boundary of the northern area is at medium to high risk and the EA data suggests an overland flow route heading towards Lake Road. This overland flow path should be maintained within the masterplanning process to reduce any increased flooding to the site. A small portion of the southern area is at low-medium risk of surface water flooding and is a result of the existing impermeable areas on site.

6.1.8. The proposed surface water drainage strategy proposes infiltration subject to further ground investigation and infiltration testing on site; this is the preferred method within the SuDS hierarchy. The surface water volumes generated as a result of the proposed development will be managed through SuDS features such as swales, dry basins, tree pits, permeable paving and cellular storage.

6.1.9. The residual flood risk to the site identifies with surface water flooding during an exceedance event however the Surface Water Drainage Strategy highlights that during an exceedance critical storm event of 1 in 100 + 40% climate change the exceedance flow paths will be directed away from buildings to hard and soft landscaped areas.

6.1.10. It is concluded that the development proposals of the site is in accordance with both National and Local Planning Policies and based on the information provided by CampbellReith within this FRA are considered sustainable and acceptable in terms of flood risk.

Appendix A: Innovation Park Masterplan

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources Ordnance Survey

LDĀDESIGN

REV.	DESCRIPTIONA	PP.	DATE

ISSUED BY	London	T: 020 7467 1470	
DATE	20.07.2018	DRAWN	ED
SCALE@A1	1:2,500	CHECKED	CM
STATUS	Final	APPROVED	MW

PROJECT TITL E
Medway Innovation Hub

DRAWING TITL E
Illustrative Masterplan

DWG. NO6278_MP_002

Z:\6278_MEDWAY_INNOVATION_HUB\TCAD\DRAWINGS\6278_MP_002_MASTERPLAN_180704.DWG

LE GEND