Appendix L: Arcadis Water Cycle Study (ES Appendix 15.2)



OTTERPOOL PARK ENVIRONMENTAL STATEMENT

Appendix 15.2 – Water Cycle Study

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Technical Glossary

- Abstraction Licensing Strategies (ALS) The production of a strategy by the Environment Agency (EA) to assess and improve the amount of water that is available on a catchment scale. Formerly referred to as Catchment Abstraction Management Strategies (CAMS), the latest ALS can be found at: https://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process/
- Affinity Water (AW) A potable water supply company, supplying water to consumers within the south east region of the UK.
- Albion Water Limited (AWL) A small water company with potable and wastewater supply and treatment capabilities within the south east region of the UK.
- Asset Management Period (AMP) A period of five years in which water companies implement planned upgrades and improvements to their asset base. For example, AMP5 is 2010-2015 and AMP6 is 2015-2020.
- Biochemical Oxygen Demand (BOD) A measure of the oxygen demand that results from bacteria breaking down organic carbon compounds in water. High levels of BOD can use up oxygen in a watercourse, to the detriment of the ecology.
- Combined Sewer Overflow (CSO) A point on the sewerage network where untreated wastewater is discharged during storm events to relieve pressure on the network and prevent sewer flooding. Sewerage systems that are not influenced by storm water should not require a CSO.
- **Deployable Output** The amount of water that can be abstracted from a source (or bulk supply) as constrained by the environment, license, pumping plant and well/aquifer properties, raw water mains, transfer, treatment and water quality.
- **Discharge Consent** A consent issued and reviewed by the EA which permits an organisation or individual to discharge sewage effluent or trade effluent into surface water, groundwater or the sea. Volume and quality levels are set to protect water quality, the environment and human health.
- Dry Weather Flow (DWF) An estimation of the flow of wastewater to a Water Recycling Centre during a
 period of dry weather. This is based on the 20th percentile of daily flow through the works over a rolling
 three year period.
- Dry Year Critical Period (DYCP) The period of time during which the customer experiences the greatest
 risk of loss of potable water supply, during a year of rainfall below the long-term average (characterised
 with high summer temperatures and high demand).
- Environment Agency (EA) A non-departmental government body with responsibilities relating to the
 protection and enhancement of the environment in England. Acts as a stakeholder for the environmental
 impacts of any proposed development.
- Eutrophication Higher than natural levels of nutrients in a watercourse, which may lead to the excessive build-up of plant life (especially algae). Excessive algal blooms remove valuable oxygen from the watercourse, block filters at water recycling centres, affect the taste and smell of water, and can be toxic to other wildlife.
- Folkestone and Hythe District Council (F&HDC) The Local Planning Authority responsible for the review and decision process for the outline planning application for developments within this area.
- **General Quality Assessment (GQA)** The current assessment method used by the EA to describe the chemical and biological quality of watercourses, along with nutrient levels and aesthetic quality.
- **Habitats Directive** Promotes biodiversity by requiring measures to be taken to maintain or restore natural habitats and wild species to a favourable conservation status, introducing robust protection for those habitats and species of European importance.
- Lead Local Flood Authority (LLFA) A unitary or county council responsible for the development of a coordinated management of flooding across their region as well as providing guidance to major planning applications from a surface water management and flood risk perspective. Kent County Council is the LLFA for Otterpool Park.

- Local Plan A document outlining the spatial planning strategy for each local authority. The Local Plan
 will contain a number of statutory documents setting out the long-term planning and land use policies for a
 given area.
- Local Nature Reserve (LNR) Are areas with wildlife or geological features that are of special interest locally. Details of LNR can be found at http://www.natureonthemap.org.uk/.
- National Nature Reserve (NNR) Are areas of national importance, protected because they are amongst the best examples of a particular habitat in the country. Details of NNR can be found at http://www.natureonthemap.org.uk/.
- National Planning Policy Framework (NPPF) The National Planning Policy Framework, updated in 2021, sets out the government's planning policies for England and how these are expected to be applied. The framework acts as guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications.
- Natura 2000 Sites Natura 2000 is a network of core breeding and resting sites for rare and threatened species and some rare natural habitat types which are protected in their own right. It stretches across all 28 EU countries, both on land and at sea. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive and the Habitats Directive. More information is available at:

http://ec.europa.eu/environment/nature/natura2000/index_en.htm.

- Nutrient Neutrality An approach that involves the key nutrients (nitrogen and/or phosphorus) arising from all surface water runoff and wastewater generated by the proposed development is less than or equal to the nutrients generated by the existing land uses and wastewater discharges in the same hydrological catchment.
- New Appointment and Variation (NAV) Are limited companies which provide a water and/or sewerage service to customers in an area which was previously provided by the incumbent monopoly provider. A new appointment is made when a limited company is appointed by Ofwat to provide water and/or sewerage services for a specific geographic area.
- **Optant** In terms of water supply the term optant is used to describe customer driven water reducing measures. A customer can choose to use these measures under recommendation from the water supplier.
- **Per Capita Consumption (PCC)** The volume of water used by one person over a day, expressed in units of litres per person per day (I/p/d).
- Population Equivalent A method of measuring the loading on a Water Recycling Centre and is based on a notional population comprising; resident population, a percentage of the transient population, cessed liquor input expressed in population, and trade effluent expressed in the population.
- **Potable Water** Water that is fit for drinking, being free of harmful chemicals and pathogens. Raw water can be potable in some instances, although it usually requires treatment of some kind to bring it up to this level.
- **Raw Water** Water taken from the environment, which is subsequently treated or purified to produce potable water.
- River Basin Management Plans (RBMP) Documents being produced for consultation by each of the EA
 regions to catalogue the water quality of all watercourses and set out actions to ensure they achieve the
 ecological targets stipulated in the WFD.
- River Ecosystem (RE) Targets Are the targets used to assess quality against the below mentioned RQO.
- **River Quality Objective (RQO)** Targets for all rivers in England and Wales that specify the water quality needed in rivers if we are to be able to rely on them for water supplies, recreation and conservation.
- Site of Special Scientific Interest (SSSI) An area of special interest by reason of any of its flora, fauna, geological or physiographical features (basically, plants, animals, and natural features relating to the Earth's structure). A map showing all SSSI sites can be found at: http://www.natureonthemap.org.uk/.
- Southern Water (SW) A large-scale water company responsible for supplying potable water and treating wastewater within the south and south-east region of the UK.

- Source Protection Zones (SPZ) Zones designated around public drinking water abstractions and sensitive receptors which detail risk to the groundwater zone they protect.
- **Special Area for Conservation (SAC)** A site designated under the European Community Habitats Directive, 1991, to protect internationally important natural habitats and species. A map showing all SAC sites can be found at http://www.natureonthemap.org.uk/.
- **Special Protection Area (SPA)** Sites classified under the European Community Directive on Wild Birds to protect internationally important bird species. A map showing all SPA sites can be found at: http://www.natureonthemap.org.uk/.
- Strategic Flood Risk Assessment (SFRA) A document required by the National Planning Guidance
 published in March 2014 that informs the planning process of flood risk and provides information on future
 risk over a wide spatial area. It is also used as a planning tool to examine the sustainability of the proposed
 development allocations.
- Strategic Housing Market Assessment (SHMA) A study of local housing markets to assess needs and demand for different types of housing in the District.
- Surface Water Management Plans (SWMP) Assist in the assessment of flood risk to ensure that
 increased levels of development, and climate change, do not have an adverse impact on flooding from
 surface water sources within the catchment. SWMP were introduced following the severe flooding in 2007,
 as means for Local Authorities to take the lead in reducing flood risk.
- Sustainable Drainage Systems (SuDS) A combination of physical structures and management techniques designed to drain, attenuate, and in some cases treat, runoff from urban (and in some cases rural) areas.
- **Target Headroom** The threshold of minimum acceptable headroom, which would trigger the need for water management options to increase water available for use or decrease demand.
- Urban Wastewater Treatment Directive (UWWTD) 1991 A European Union directive (91/271/EEC) which sets treatment levels on the basis of sizes of wastewater discharges and the sensitivity of waters receiving the discharges. Under the Directive, the UK is required to review environmental waters at four-yearly intervals to determine whether they are sensitive to the effects of wastewater discharges.
- Water Available for Use (WAFU) The amount of water remaining after allowable outages and planning allowances are deducted from the deployable output in a WRZ.
- Water Cycle Study (WCS) a document that is produced as part of the pre-planning documents that allow the Local Planning Authority to make an informed decision and recommendations regarding water supply and wastewater treatment as a result of proposed development. A WCS provides an indication of the most up to date requirements for the water cycle management and infrastructure impacts.
- Water Framework Directive (WFD) (2000) A European Union directive (2000/60/EC) which commits member states to make all water bodies of good qualitative and quantitative status by 2015. The WFD could have significant implications on water quality and abstraction. Important dates for the WFD are: 2015
 - Meet environmental objectives;
 - First management cycle ends;
 - Second river basin management plan and first flood risk management plan.

2021

Second management cycle ends.

2027

- Third management cycle ends, final deadline for meeting objectives.
- Water Neutrality The concept of offsetting demand from new developments by making existing homes and buildings more water efficient.
- Water Resource Zone (WRZ) Are areas based on the existing potable water supply network and represent the largest area in which water resources can be shared.

- **Wastewater** Is any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture.
- Wastewater Treatment Works (WwTW) Facility which treats waste water through a combination of physical, biological and chemical processes.
- Water Resource Management Plan (WRMP) The Water Resource Management Plans are studies undertaken by every water company in England to determine the availability of water resources for the next 25 years. WRMPs can be found on most water company websites.
- Water Sensitive Urban Design (WSUD) A land planning and engineering design approach which integrates the urban water cycle, including storm water, groundwater and wastewater management and water supply, into the urban design to minimise environmental degradation and improve aesthetic and recreational appeal.

Executive Summary

Otterpool Park LLP, as the applicant, are proposing a garden settlement called Otterpool Park (the proposed Development) that is located to the west of Folkestone in Kent.

Arcadis has prepared this updated Water Cycle Study (WCS) Report on behalf of Otterpool Park LLP as well as a separate Flood Risk Assessment (FRA) and a site-wide Surface Water Drainage Strategy (SWDS) Report¹, as part of the amended outline planning application for the proposed Development. The amended application for planning permission relates to an existing outline planning application that was submitted to F&HDC as the local planning authority ('LPA') in 2019 (the '2019 planning application'), under planning reference Y19/0275/FH.

The amended outline planning application is part of a three-tier approach to the planning process and seeks permission for a new garden settlement accommodating up to 8,500 homes (Use Classes C2 and C3) and Use Class E, F, B2, C1, Sui Generis development with related infrastructure, highway works, green and blue infrastructure, with access, appearance, landscaping, layout and scale matters to be reserved. The - Application Site, which has a total area of approximately 589 ha, is located within the wider Otterpool Framework Masterplan Area, which ultimately aims to deliver up to 10,000 new homes across a total area of 756 ha.

In order for the development to be policy compliant a site-specific WCS, that meets with the requirements of the policies from the F&HDC Core Strategy Review (2022), is required. This report presents the findings of the updated WCS, promoting an integrated approach to sustainable water management. This should be read in conjunction with the updated FRA and SWDS Report¹ that has also been prepared by Arcadis to support this amended planning application.

Water Resources and Supply Infrastructure

Otterpool Park is situated to the west of Folkestone, which is known to have limited surface water or groundwater resources and is considered a water-stressed area. The Environment Agency (EA) currently class the surface water and groundwater resources within the District as over-licensed or over-abstracted, meaning that there is no additional water available for supply. This highlights the importance of further developing policies to encourage the conservation of water in new and existing dwellings, and commercial properties.

Based on the currently known forecasts, Affinity Water (AW) has confirmed there is water infrastructure supply capacity for the early phase(s) of Otterpool Park, of approximately 1,500 additional residential units over-andabove the remaining quantum of growth modelled for in the latest forecasting completed for their Water Resource Management Plan 19² (WRMP19), which will cover the period from 2020 to 2080.

WRMP19 forecasts a population growth of approximately 13% by 2025, 32% by 2045 and 64% by 2080, equivalent to over 100,000 more people living in the Water Resource Zone 7 (WRZ7) that Otterpool Park is also located. This growth in demand results in the small surplus of 1.3 Ml/day under average conditions in 2020 moving to a small deficit of 0.1 Ml/day under average conditions in 2045 to a larger deficit of 4.3 Ml/day under average conditions in 2080. WRMP19 confirms that there are no planned sustainability reductions in WRZ7 at average or peak conditions. It also shows that no noticeable long-term climate change impact is expected on supply in WRZ7.

AW has some headroom at present in terms of both water resources and distribution network for the initial 1,500 homes, but an offsite infrastructure upgrade will be required to accommodate the full development. The required reinforcement can be planned and implemented ahead of the remaining development through the normal water industry's five-yearly business planning process. The routing to the proposed point of water supply connection for Otterpool will be from the northeast.

Additional water efficiency measures encouraging Water Sensitive Urban Design (WSUD) principles will be put in place to a restricted and limited maximum desirable target amount of extra drinkable water consumed by each new household to 110 litres of water per person, per day. Opportunity to further reduce the extra drinkable water consumption will be maximised, where possible, with targeted and site-based integrated water

¹ 10029956-AUK-XX-XX-RP-CW-0010-P3-FRA & SWDS, Arcadis March 2022 (ES Appendix 15.1)

² Water Resource Management Plan 19, Affinity Water April 2020

reuse solutions for other non-drinkable water uses. This will reduce the extra water demand across the site as a whole.

Wastewater Treatment and Sewage

Wastewater in the District is currently collected and treated by Southern Water (SW). There are two potential offsite treatment options for the proposed Development to discharge. This would be either to the nearby Sellindge Wastewater Treatment Works (WwTW) approximately 1 km to the west or West Hythe WwTW in the adjoining catchment, approximately 7 km to the southeast. SW has completed a feasibility study to identify what additional wastewater infrastructure upgrades would be required to serve the proposed Development at their preferred Sellindge WwTW. This feasibility study confirmed that a new rising main and major upgrade to the existing works will be required in a phased manner. SW has not identified any fundamental reasons why development should not go ahead as the required new infrastructure can be delivered through the water industry's five-yearly business planning process to match with the proposed development trajectory and phasing plans at Otterpool Park. The current Asset Management Plan (AMP7), which covers the period 2020 to 2025 has already made the necessary provisions to undertake the required detailed investigations and initial infrastructure upgrades to accommodate Otterpool Park. As part of this, a Risk and Value exercise is currently underway by SW.

However, Sellindge WwTW and other WwTWs that are discharging into the River Stour and surroundings are subject to a separate detailed investigation in connection with their potential negative impacts on the Stodmarsh European designated sites under the Environment Agency's (EA's) Water Industry National Environment Programme (WINEP) that will report in 2022. This WINEP investigation has been initiated to investigate potential links between the River Stour and the Stodmarsh lakes systems, then propose appropriate, possible and cost-effective solutions to resolve any identified impacts. Until this WINEP study is complete, including any mitigation solutions are fully implemented (i.e., if deemed required) all new development in the impacted Stour catchment must achieve nutrient neutrality as per the latest Natural England's (NEs) guidance for Stodmarsh sites.

Therefore, it is currently proposed that the initial development phases will be served by a dedicated onsite WwTW with suitable additional onsite nutrient neutrality mitigation. This will include a minimum of 25 ha of constructed wetlands and a minimum of 35 ha of woodland planting to offset surplus Nitrogen and Phosphorous, due to the wastewater and surface water discharges from the proposed Development. This approach has been agreed with the NE and the EA in principle so that Otterpool Park will ensure nutrient neutrality, as per the required precautionary principle to protect the integrity of the downstream Stodmarsh lakes sites.

The onsite WwTW will be located within the red line boundary towards the northwest corner (at Development Parcel HT.5) and two options have been identified for the final treated effluent discharge outfall location, one upstream location on the River East Stour near to the onsite WwTW and a second further downstream location on the same watercourse near to the Sellindge WwTW. The latest discussions with Severn Trent Connect (STC), which has been identified as the New Appointment and Variation (NAV) company for Otterpool Park, indicate that providing onsite works to achieve both the nutrient neutrality and the EA's proposed discharge permits are viable. The modular onsite WwTW will be constructed and commissioned in three main phases to match with the proposed development trajectory. This phased approach will also ensure the flexibility to connect the later development phases of the Otterpool Framework Masterplan Area to Sellindge WwTW, if deemed required.

A new appointment is made where a limited company is appointed by Ofwat to provide water and/or sewerage services. A NAV, therefore, involves one company replacing another as the appointee for a specific geographic area. In line with the current EA legislation and policies, new discharges should first consider connecting to existing infrastructure, where reasonable although as stated above this is currently not viable due to the ongoing WINEP study and the limited capacity currently available within the existing network and Sellindge WwTW that require major upgrades following detailed design, which is currently on hold till the outcome of WINEP study is available.

Water Quality

The results of the indicative water quality discharge permit analysis indicate that the proposed development will not lead to a Deterioration of WFD status or unduly compromise the achievement of Water Framework Directive (WFD) Good Status in the receiving watercourses. The WFD assessment³ has been undertaken, which confirmed that the proposed wetlands and other surface water and flood mitigation measures indeed helps to improve water quality, ecology and biodiversity benefits of the proposed Development.

However, tightened water quality parameters will be required as the existing WwTW flow consents are exceeded and new discharge permits are issued by the EA. The increased flows as a result of the proposed development trajectory do not present any major constraints in relation to wastewater treatment or water quality subject to the timely implementation of new infrastructure. Therefore, engagement with the EA and Water and Sewerage Companies should continue throughout the planning and construction process to facilitate timely site-specific assessments and phased infrastructure implementation.

Flood Risk and Surface Water Management

An updated site-specific assessment has been completed considering the flood risk to the proposed development from all sources, including fluvial, surface water, groundwater, sewer and tidal. This has been completed following guidelines set out by the latest National Planning Policy Framework⁴ (NPPF) and the associated Flood Risk & Coastal Change planning practice guidance⁵ (PPG), including the Strategic Flood Risk Assessments⁶ (SFRA) completed for F&HDC.

All proposed main built development areas will be located outside the high and medium risk flooding areas with suitable detailed hydraulic modelling (including climate change mapping), satisfying the NPPF sequential test/approach requirements. An exception test has also been performed for the three new bridge crossings over the River East Stour. The proposed design has been discussed with the EA, and it will ensure that the development is safe over the recommended 100-year minimum design life, while addressing ecology needs, climate change risk and helping to reduce offsite flood risk through additional floodplain enhancements and an integrated water management strategy.

Otterpool Park will aim to be an exemplary site with provision of extensive Sustainable Drainage Systems (SuDS) and multi-functional green space, promoting WSUD principles. They will ensure that flooding and surface water drainage needs are fully accounted for and mitigated, while reducing extra potable water demand and maximising overall environmental benefits through an integrated approach to Green Infrastructure, Biodiversity and Water Management.

A high-level assessment indicates that extra WwTW discharges will not appreciably increase flood risk when compared to the current baseline situation. The increased flow from each WwTW location is classified overall as having a low flood risk on the receiving River East Stour, when considered in conjunction with the surplus long-term attenuation storage and reduced peak flow discharge from the proposed extensive SuDS, nutrient mitigation wetlands and floodplain enhancement measures. The development proposals can indeed reduce downstream flood risk.

The FRA&SWDS Report¹ details how all flood risk and surface water management needs are managed, as part of an integrated water management strategy. The proposed strategy will include an interconnected network of well-designed and managed onsite swales, basins, ponds and wetlands with dedicated outfalls within the site boundary to meet the agreed integrated approach and limiting parameters with the EA and Lead Local Flood Authority (LLFA) in order to collect, treat, infiltrate, transport and store water, while encouraging water reuse where practical. This system of drainage will manage and reduce flood risk by limiting development runoff below the current greenfield rates during extreme events and will maximise available water resource from rainfall during the normal events.

³ 10029956-AUK-XX-XX-RP-CW-0034-P2- WFD Screening Report, Arcadis, October 2021

⁴ National Planning Policy Framework, Ministry of Housing, Communities & Local Government July 2021

⁵ Flood risk and coastal change Planning Practice Guidance, Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, March 2014

⁶ Level 2 Strategic Flood Risk Assessment, Herrington Consulting/ F&HDC (Shepway) July 2015

1 Introduction

Otterpool Park LLP, as applicant for an amended outline planning application, intends to develop approximately 589 hectares (ha) of land in the vicinity of Otterpool Park (hereafter referred to as the site) within the administrative area of Folkestone & Hythe District Council (F&HDC) in Kent, to develop a new garden settlement known as Otterpool Park. The new garden settlement (the 'proposed Development') is proposed as part of the UK Government's nationwide initiative to deliver new housing stock across the country, including the Locally-Led Garden Cities, Towns and Villages programme that was first announced by the Department for Communities and Local Government (DCLG) in 2016⁷.

This document relates to the amended application for planning permission that was originally submitted to F&HDC as the local planning authority ('LPA') in 2019 (the '2019 planning application'), under planning reference Y19/0275/FH, and which was the subject of environmental impact assessment (EIA). It was proposed to amend the 2019 planning application to enable a revised and more flexible approach to the planning implementation process, while incorporating some general updates to the proposed Development. The revised three-tier approach to the planning process and the key changes to the proposed Development is described in Section 1.5.

This report presents the findings of the updated WCS, to guide Otterpool Park LLP and F&HDC to make informed decisions with suitable recommendations regarding the proposed Development. Extensive consultation has been undertaken with Southern Water (SW), Affinity Water (AW), Severn Trent Connect (STC), Albion Water (AWL), Natural England (NE) and the Environment Agency (EA) as well as other relevant parties such as Kent County Council (KCC) in order to provide an indication of the most up to date requirements for the sustainable water cycle management planning and associated infrastructure impacts.

This updated WCS assessment has used the following key data sources as detailed in Section 2:

F&HDC- Development policies and site mapping;

- SW Asset datasets and feasibility studies for sewers / pumping stations / Wastewater Treatment Works (WwTW);
- STC and AWL Information on the provision of a new onsite WwTW and water reuse proposals;
- AW Water Resource Management Plan 2019 and new water infrastructure requirements;
- **NE** Nutrient neutrality mitigation advice;
- **EA** River Basin Management Plan, water body quality, Catchment Abstraction Licencing Strategies, flood risk data, and environmental permits.

Other key information that has been drawn on is also referenced in the subsequent sections, as required.

1.1 The Role of this Document

This updated WCS report first examines the existing water environment, water and wastewater infrastructure, and provides an assessment of the water and wastewater infrastructure constraints and opportunities associated with the Otterpool Park, with reference to associated documentation. This document then provides an assessment of potential holistic and strategic options for implementing and managing the identified integrated water management mitigation solutions to enable the effective and sustainable delivery of the Otterpool Park as a leading exemplar project, while ensuring that the required water and wastewater infrastructure is fully considered within the early stages of planning and design. It also provides further recommendations for the next stages of the proposed Development.

This document will inform the Blue-Green Infrastructure Proposals, Sustainability Statement and Design and Access Statement (ES Appendix 4.16), to develop an overarching framework for how water can be fully integrated and managed across the development while delivering wider sustainability objectives of the

⁷ Locally-Led Garden Villages, Towns and Cities, Department for Communities and Local Government March 2016 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/733047/Locally-led_garden_villages_towns_and_cities_archived.pdf)

Otterpool Park, including sense of place, biodiversity net gain, education and awareness, and water sensitive behaviour to maximise potential benefits within the development and downstream communities.

A key ambition of the Otterpool Park is environmental responsibility and stewardship. As a development of significance, the development has considered sustainability in all its forms, including the human impact on the planet resulting in climate change, loss of critical ecosystem services, carbon footprint, potable water consumption and waste generation. Developments such as at Otterpool Park can contribute to sustainability targets by creating new places that demonstrate major reductions in carbon and significantly reduce their water footprint. The development proposes ambitious water use targets, and integrated and sustainable drainage principles to mitigate the potential impact of the development on the natural water cycle and catchment processes.

The preferred strategies for the provision of; potable water to the development, collection and treatment of wastewater, and water reuse options have been appraised in conjunction with third-party infrastructure providers, AW and SW.

The confirmation of a long-term sustainable, commercially viable and technically feasible strategy requires detailed technical discussions. However notable progress has been made to develop integrated water management solutions addressing water supply, flood risk and environmental issues, which are reported here.

Arcadis has also prepared an updated site-specific Flood Risk Assessment (FRA) and Surface Water Drainage Strategy (SWDS)¹ document for the development, in parallel with this updated WCS. For this reason and to avoid repetition, this WCS mainly includes flooding and surface water considerations where a potential link exists with water supply, and wastewater collection and treatment. Therefore, a reference to the above document should be made for the full detail on flood risk and surface water management, along with the relevant chapters in the Environmental Statement.

1.2 The Water Cycle

The natural water cycle as illustrated in Figure 1 below is the process by which water is transported throughout a region. The process commences with some form of precipitation, be it rain, snow, sleet or hail. This is then intercepted by the ground and either travels overland through the process of surface runoff to rivers or lakes, or percolates through the surface and into underground water aquifers.

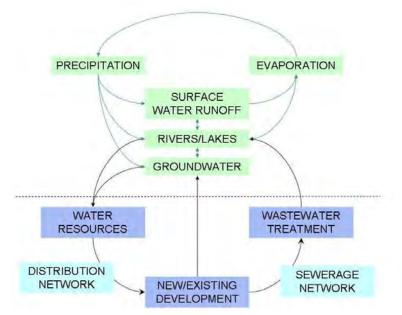


Figure 1: The Wider Water Cycle.

The presence of vegetation can also intercept this precipitation through the natural processes that plants carry out, such as transpiration and evapotranspiration. The water will eventually travel through the catchment and will be evaporated back into the atmosphere along the way or will enter the sea where a large amount will be evaporated from the surface. This evaporated water vapour then forms into clouds and falls as precipitation again to complete the cycle.

Urbanisation and new development such as Otterpool Park, create a number of interactions with the natural water cycle. Abstraction of water, from both surface water and groundwater sources for use by the local population, interacts with the water cycle by reducing the amount of water that is naturally held within the aquifers. Following treatment at a Water Treatment Plant this water, now potable, is transported via trunk mains and distribution pipes to the dwellings in the area. The potable water is then used by the population within the dwellings for a number of different purposes, which creates large volumes of wastewater.

The use of paved and other surfaces in this development also reduces the amount of water that is able to percolate through the underlying soil to the groundwater aquifers. This increases the rate of surface water runoff, which leads to flooding and increased peak discharges in rivers if not appropriately managed. Therefore, within the development permeable hard surfaces and drainage techniques that encourage infiltration should be used where possible to keep rainwater in the ground and slow down the transit to the watercourses and reduce the risk of flooding. Flood risk management and surface water management will be in the form of SuDS to maintain the natural water cycle as far as possible.

The wastewater from the developments is transported via the sewerage network to a WwTW, where the water is screened, treated, and then discharged back into the rivers or groundwater. Discharges from WwTW require consent from the EA. This consent will set out the maximum volume of treated wastewater that can be discharged, and the quality standards that this discharge must meet. Typically, the consent will set limits on the concentrations of the following physiochemical determinands: Ammoniacal Nitrogen (Amm. N), Biochemical Oxygen Demand (BOD) and suspended solids in the discharge. In addition, the consent can stipulate a Phosphorous (SRP) concentration, along with limits on the concentrations of other chemicals (such as Iron) used in the Phosphorous stripping process.

The key elements of the water cycle relevant to the Otterpool Park is described within the following chapters:

Water Environment Evidence Base Review – Chapter 2 Water Resources and Supply – Chapter 3 Water Treatment and Sewerage – Chapter 4 Integrated Water Management Strategy – Chapter 5

Chapter 1 below also summarises the site characteristics, planning strategy and development proposals.

1.3 Study Location and Characteristics

The proposed Development is located on approximately 589 ha of land directly south-west of Junction 11 of the M20 motorway, and south of the Channel Tunnel Rail Link (CTRL) in the administrative area of F&HDC in Kent (see Figure 2). The site is centred around National Grid Reference TR112 365 in the general area of Otterpool Manor buildings. Much of the site is greenfield in nature and is predominantly occupied by agricultural uses and associated farm holdings, as well as some residential and light commercial uses. A range of historic land uses associated with both rural and commercial/industrial activities have been present on the site.

The site is located within an area that has been formed from the geological development of the Kent North Downs. The site topography generally slopes from the south toward the north-west where the River East Stour traverses the site from east to west, with variable undulating landforms present across the central parts. Site levels range from 57m above ordnance datum (AOD) in the north-west to 107m AOD in the south.

The site is linked off-site to the north-west and south-east via the A20 Ashford Road that traverses through the central part of the site. The site is bounded by a section of Harringe Lane and farmland to the west and Harringe Brooks Woods and more farmland to the south-west. The southern boundary wraps around Lympne industrial

estate, Aldington Road and Lympne. The northern site boundary runs largely parallel with, and adjacent to, the CTRL line and borders the settlement of Sellindge.

The site area excludes the parcels of land at Otterpool Manor, Upper Otterpool and south of Westenhanger. The south-eastern and eastern boundary is bordered by the settlements of Lympne and Newingreen and further north the eastern boundary runs parallel with the A20 before terminating at the intersection of the A20 (Ashford Rd) with the CTRL line.

The site is characterised by the River East Stour that flows from east to west across the northern part of the site and to which three tributaries (Harringe Brook, North Lympne Drain and Racecourse Drain) and associated drainage channels are connected. The majority of these existing watercourses flow from east and south to the north and west. The River East Stour leaves the red line boundary at the north-west corner of the site and flows west towards Ashford, where it joins the Great Stour. The site has some associated flood risk associated with the River East Stour and its tributaries, as discussed in Section 5.1.

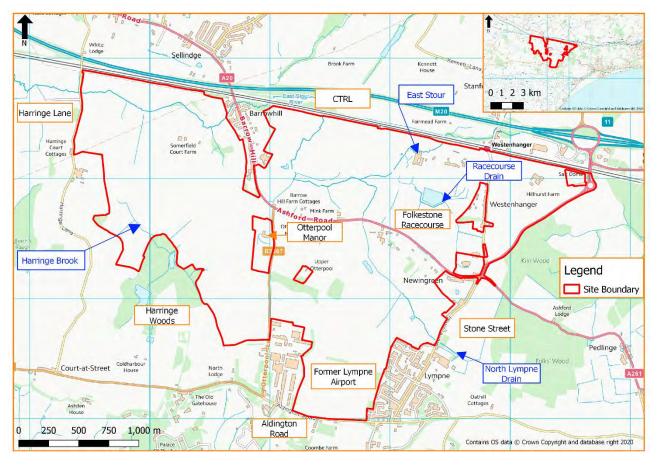


Figure 2: Location Plan

(The planning Application Site boundary is outlined in red.)

Currently, there are no existing settlements on site. Scattered residences are present along Ashford Road and the A20. Larger settlements are present just outside the Application Site boundary in Barrow Hill to the north and Lympne to the south east. Review of the UK Centre for Ecology and Hydrology (CEH) Land Cover Map (LCM) 2007⁸ dataset shows that existing land cover comprises arable land, both improved and rough grassland, woodland and pockets of urbanised areas.

A large proportion of the site area is occupied by farmsteads and associated agricultural land for a mixture of arable and livestock breeding purposes. There are farmsteads located at Somerfield Court Farm (west of

⁸ UK Land Cover Map LCM2007. 2011. Centre for Ecology and Hydrology.

Barrow Hill), Barrow Hill Farm (east of Barrow Hill), Hillhurst Farm (east of Westenhanger) and several smaller practices located adjacent to the A20 in the area of Newingreen. The historical Lympne Airport site is now partially used as Lympne Business Park. Folkestone racecourse is present in the north east, however, is no longer functioning.

Land within the site that lies to the north of the A20 is mainly occupied by a mixture of agricultural land, the River East Stour watercourses and a man-made lake in the centre of the former Folkestone Racecourse. Hillhurst Farm lies in the north-eastern corner of the site, while a number of disused racecourse pavilion buildings are present directly east of Westenhanger Castle. Barrow Hill Farm lies 50 m east of the northern stretch of the A20 that runs through Barrow Hill, close to the intersection of the A20 and Otterpool Lane is a café and small lorry parking area, beyond further north of which lies Barrow Hill Farm.

To the south of the A20, the land east of Otterpool Lane is predominantly occupied by farm land and a number of small holdings along the A20 itself. To the north of A20, a section of the River East Stour traverses the site from south to north, and disused quarry workings south of the A20 form a designated a geological Site of Special Scientific Interest.

Land to the west of Otterpool Lane and the northern stretch of the A20 is occupied mainly by agricultural land and the River East Stour. Other features in the area include Park Wood and Somerfield Court Farm located west of Barrow Hill, and Springfield Wood located adjacent to the western site boundary.

The superficial and bedrock outcrop geology at the site is shown in Figure 3.

The hydrogeology aquifer classification data from the British Geological Survey (BGS)⁹ shows that the site lies upon a section of the Lower Greensand Group, which is a highly productive aquifer with significant intergranular flow. This formation generally consists of sandstone and conveys water of a soft nature with good infiltration rates. A small proportion of the site to the west is located upon a section of the Wealden Group, which consists mainly of sandstones and limestones with very small yields for low-quality water.

An initial analysis of the limited available British Geological Survey (BGS) borehole scans¹⁰ for the site area did not highlight the presence of shallow groundwater levels, but further site-specific ground investigation is required to confirm this.

The EA has defined Source Protection Zones (SPZs) for 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. After a review of the EA SPZ¹¹ data, it can be concluded that no SPZs are located within the site boundary. The closest SPZ in proximity to the site is 2.2 km to the east. This indicates that, should infiltration-based methods of surface water drainage be applied, the impacts on existing potable water abstractions would be limited.

The Otterpool Park is within Water Resource Zone (WRZ) 7 for which potable water provision is currently managed by AW. The WRZ7 is supplied via a number of groundwater abstractions from the underlying chalk aquifer and the import of treated water from neighbouring water companies, namely South East Water and Southern Water. More information regarding potable water supply is included in Section 3.

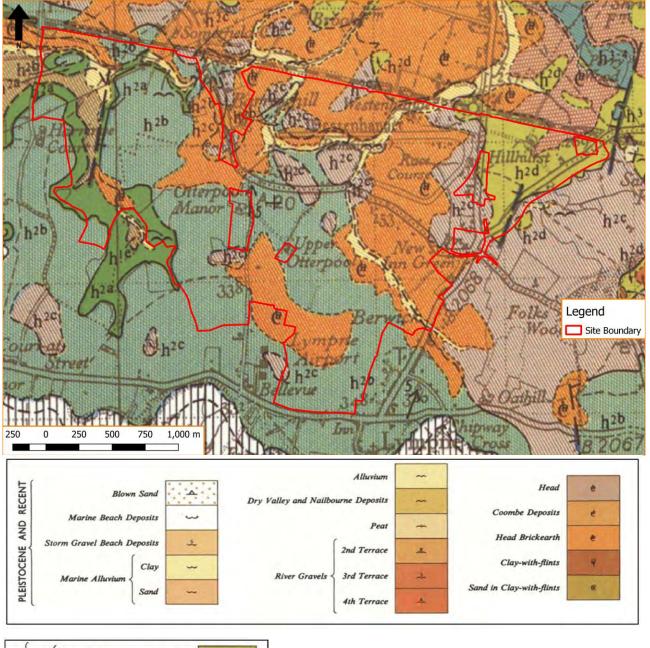
The company responsible for collecting and treating wastewater within the study area and surrounds is Southern Water. More information is included in Section 4.

Sources of flood risk within the District were identified in the Folkestone and Hythe District SFRA⁶. Key messages from this report, and other relevant flood risk policies, are highlighted and built upon in Section 5.0.

⁹ https://www.bgs.ac.uk/datasets/hydrogeology-625k/, aquifer classification, British Geological Survey 2021

¹⁰ Borehole Scans. British Geological Survey, 2016 (available at https://www.bgs.ac.uk/information-hub/borehole-records/)

¹¹ Source Protection Zone mapping. Environment Agency. Available at https://magic.defra.gov.uk/MagicMap.aspx



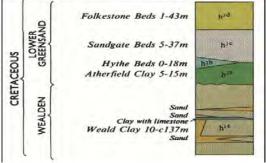


Figure 3: Superficial and bedrock geology (Source: BGS). (The planning Application Site boundary is outlined in red.)

1.4 Revised Planning Approach

Following consultation on the Environment Statement submitted as part of the 2019 planning application (the '2019 ES'), a 'three-tier' approach is proposed for the amended planning application. The conditions that would be attached to the Tier 1 outline planning permission, if granted, would require two further consents stages to control the design and delivery of the proposed Development from outline to the reserved matters stage. It is anticipated that there will be development quantum threshold 'triggers' that will inform the need to provide certain key infrastructure in advance of other development land parcels or zones coming forward. These triggers will be established by the LPA and key infrastructure providers in order to demonstrate how the proposed Development can be constructed without the need for fixed development phasing at the outline application stage.

The 'three tier' system includes the following key stages, as illustrated in

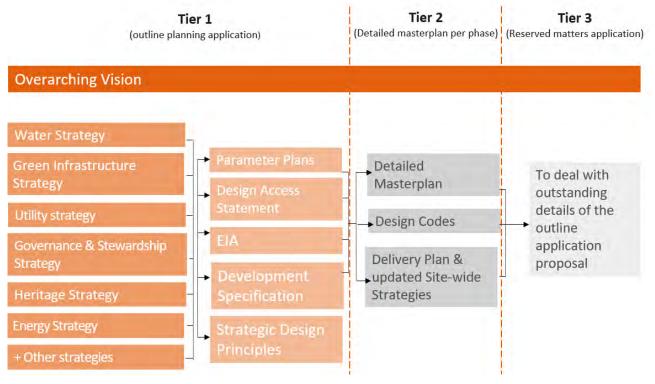


Figure 4:

- **Tier 1: Outline planning application** agreement of overall land uses, parameter plans and a series of site wide strategies.
- **Tier 2: Detailed masterplan and design code for each phase** each phase of development will need to be supported by a detailed masterplan that will accord with the Tier 1 material.
- **Tier 3: Reserved Matters application** each development plot will need to be the subject of a reserved matters application, the detail of which will need to include detailed design for the relevant plot and will need to be in accordance with the information approved as part of Tier 1 and Tier 2.

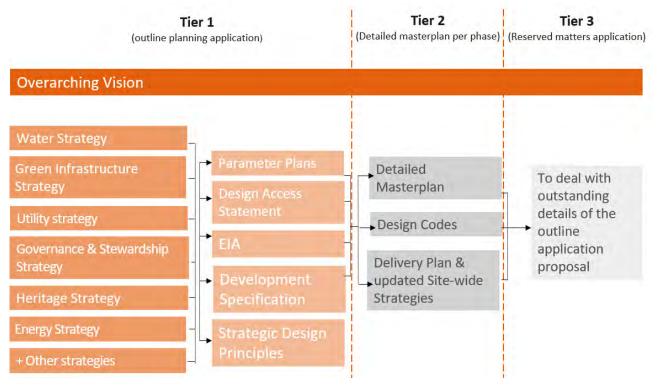


Figure 4: Tiered planning approach.

1.5 **Development Proposals**

The proposed main development area considered in the Tier 1 outline planning application is located on approximately 589 ha of land within the redline site boundary shown in Figure 1. It is located within the wider Otterpool Framework Masterplan Area, which ultimately aims to deliver up to 10,000 new homes across a total area of 756 ha. Details of the proposed Development are given in the Development Specification (ES Appendix 4.1) and Strategic Design Principles (ES Appendix 4.3) submitted as part of the amended outline planning application documentation, along with the Parameter Plans (ES Appendix 4.2) for approval and other supporting plans. The key changes to the previous development scheme include:

- The inclusion of Westenhanger Castle within the redline planning Application Site boundary; and
- The inclusion of additional land in the north-west of the Site for wastewater treatment.

The planning application seeks permission for a new garden settlement accommodating up to 8,500 homes (Use Classes C2 and C3) and Use Class E, F, B2, C1, Sui Generis development, including use of retained buildings as identified, with related infrastructure, highway works, green and blue infrastructure, with access, appearance, landscaping, layout and scale matters to be reserved. A summary of the maximum floorspace areas for approval for each land use is shown in Table 1.

Table 1: Total Proposed Residential Units and Floorspace by Use

Land Use	Including	Maximum No. of Proposed Units
Residential	Residential units and Extra Care accommodation	8,500
Land Use	Including	Proposed Gross External Area (GEA) Floorspace (m²)

Education and Community Facilities	Schools, nurseries, crèches, reserve school floorspace and/or SEN, health centres, place of worship, community centres.	Up to 67,000
Hotel	Hotel	Up to 8,000
Leisure	Sports pavilion and indoor sports hall	Up to 8,500
Mixed retail and related uses	Shops, professional services, restaurants, cafes, drinking establishments, hot food takeaways, offices, businesses	Up to 29,000
Employment	Commercial business space in hubs, commercial business park, light industrial business park.	Up to 87,500
Total		Up to 200,000

In line with the concept of the proposed Development as a 'new garden settlement', a high proportion of the development will either be retained open land or comprise new formal and informal open space provision. Parameter Plan OPM(P)4002_YY (ES Appendix 4.2), confirms the location of open space across the site. This open space will include public realm and space for leisure, sport and play as well as other forms of open space, such as up to 5 ha of burial ground. The parameter plan secures 260.5 ha of open space (44% of the Application Site). Furthermore, as an indicative guideline, it is anticipated that within Development Areas (other than private gardens) approximately 10-15% of the land will be provided as open space. This will result in approximately 50% of the total Application Site being open space. The open space will provide a range of green infrastructure, for example, formal play areas, habitats, space for food production and outdoor sports.

A network of proposed primary roads will provide access through Otterpool Park, connecting both sides of the A20 and serving the station, town centre, schools, local centres and employment as well as giving access to the residential areas. These routes will provide for bus movements and have walking and cycling connections alongside. The proposed development areas and primary roads are indicated in the Development Areas and Movement Corridors Parameter Plan (OPM(P)4001_YY, ES Appendix 4.2). There will also be other access roads delivered across the Site but the detail of these will not be submitted until Tier 2 and Tier 3 stages.

The development proposals are detailed in the Parameter Plans (ES Appendix 4.2), Development Specification (ES Appendix 4.1) and Strategic Design Principles (ES Appendix 4.3), along with the supporting illustrative masterplan (ES Appendix 4.5) submitted with the amended planning application. As part of this, three new road bridge crossings over the River East Stour are proposed to connect the proposed Development through the Riverside Park.

The proposed SuDS strategy makes use of the existing River East Stour and drainage tributaries as part of a 'blue-green corridor'. The SuDS strategy will take account of the capacity of existing watercourses and include proposals to designate land for landscaped flood alleviation purposes (i.e., in the form of 'blue-green corridors'), while enhancing the role and amenity of existing watercourses and landscape through the site. Opportunities will be taken to maintain important hedgerows and trees on the site, as well as providing new planting and enhance the local biodiversity.

Otterpool Park is set on a path towards net zero carbon. The proposed Development will align with, and surpass, regional and national energy and carbon policy requirements, and exceed interim Future Homes Standard targets. It will integrate smart solutions and exploit new technologies and commercial arrangements in the design of sustainable and cost-effective homes across the proposed Development's lifecycle. The landscape-led masterplan is key to achieving environmental and social sustainability as well as designing a low carbon development that is accessible to people with different needs and on different incomes. The proposed Development aims for a quality sustainable community with a sense of vitality, a distinctive local

character, and a close connection with its natural environment. The Sustainability Statement¹² sets out the foundations of the integrated vision that links energy, water, transport, infrastructure, resources, waste, biodiversity, and place-making with the local aspects of community, culture, and economy.

1.6 Development Trajectory

The development trajectory to be included in the Tier 1 Outline Planning Application includes a total of 8,500 residential units completed by 2042. Outside the Application Site boundary, the total Otterpool Park proposes to include an extra 1,500 homes, bringing the overall total to 10,000 homes by 2044. Therefore, to ensure the total impact of the Otterpool Park Framework Masterplan is included the WCS calculations assess the total 10,000 units to 2044.

A breakdown of the indicative development trajectory (based on the Illustrative Accommodation Schedule, ES Appendix 4.4) and phasing for the residential properties assumed in this assessment is summarised in overleaf and a detailed breakdown, including non-residential areas, is contained in Appendix A.

To assess the impact of the proposed Development on the water infrastructure, an estimate of the predicted population and dwellings amounts, and hence occupancy rate, is required. Therefore, as per the masterplan assumptions, an average occupancy rate of 2.4 has been adopted as a constant occupancy rate for calculations in the WCS. This occupancy rate will ensure a conservative estimate of the impacts on the water infrastructure and wider water environment.

¹² Otterpool Park Sustainability Statement, Arcadis March 2022

Table 2: Otterpool Park	Indicativa	Development	Trajectory ¹³
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Year	Annual Residential Dwellings Built (No.)	Cumulative Dwellings Total (No.)	Within Tier 1 Application Site? (Yes/No)
2024	121	121	Yes
2025	264	385	Yes
2026	331	716	Yes
2027	350	1,066	Yes
2028	423	1,489	Yes
2029	423	1,912	Yes
2030	528	2,440	Yes
2031	528	2,968	Yes
2032	557	3,525	Yes
2033	498	4,023	Yes
2034	502	4,525	Yes
2035	534	5,059	Yes
2036	534	5,593	Yes
2037	504	6,097	Yes
2038	504	6,601	Yes
2039	661	7,262	Yes
2040	535	7,797	Yes
2041	582	8,379	Yes
2042	121	8,500	Yes
2042	435	8,935	No – part of wider masterplan
2043	531	9,466	No – part of wider masterplan
2044	534	10,000	No – part of wider masterplan

¹³ Otterpool Park Illustrative Accommodation Schedule (ES Appendix 4.4)

1.7 Key Stakeholders

Stakeholder engagement is key to informing and providing an evidence base for the WCS in terms of the water resource, wastewater treatment capacity and water environmental capacity constraints. The following Stakeholders have been engaged throughout the WCS preparation process:

EA – Flood Risk, Water Resources and Water Environment;

SW – Sewerage and Wastewater;

STC and AWL - Sewerage and Wastewater;

AW – Water Resources and Supply;

KCC - Water Resources and Surface Water;

NE - Landscape and Water Environment;

F&HDC - Development policies and proposals; and

Ashford Water Group and Ashford Borough Council - Cross boarder issues.

Consultations have been undertaken through meetings and teleconferences, and representation provided to F&HDC. A summary of the consultation meetings that have taken place is given in Appendix B.

2 Water Environment Evidence Base Review

2.1 Policy Context

The following sections introduce the national policies relating to mitigating the impacts on the water environment from new development.

2.1.1 National

2.1.1.1 National Planning Policy Framework

The National Planning Policy Framework⁴ (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced to contribute to the achievement of sustainable development. The NPPF also relies on the fact that specific details of the requirements previously obtained from national planning policy will be set out in local plans. These plans will be founded on a locally developed evidence base, including relevant technical studies, such as this Water Cycle Study. By emphasising the importance of local plans, local communities will feel empowered to decide the look and feel of the local area.

Local authorities should ensure that planning documents consider these policies, and they can use some of the policies contained within NPPF to make decisions on individual planning applications. The key themes in the NPPF that are most relevant to this WCS are:

- Delivering Sustainable Development and Climate Change;
- Housing;
- Biodiversity and Geological Conservation;
- Planning and Pollution Control; and
- Development and Flood Risk.

Relevant topics that consistently occur within the above mentioned NPPF are:

- Conservation / biodiversity;
- Sustainable use of resources;
- Mitigation of flood risk and the use of SuDS;
- Suitable infrastructure capacity; and
- Protection of groundwater and freshwater.

The proposed development has a mixed flood risk vulnerability classification, ranging from 'Water Compatible' (areas of open space and recreational/sports facilities), to 'Less Vulnerable' (commercial and employment space) to 'More Vulnerable' (residential use, schools and health facilities) as per the NPPF Annex 3. Flood Risk and Coastal Change Planning Practice Guidance⁵ also states that the lifetime of a residential development is at least 100 years in terms of flood risk and coastal change.

2.1.1.2 Flood and Water Management Act 2010

The Flood and Water Management Act 2010¹⁴ sets out a number of changes to the way that new development and water infrastructure will interact, including the proposed future mechanism for utilising SuDS where practical. SuDS assist in reducing the runoff rates (and potentially volumes) of surface water arising from new developments and therefore reducing the impacts on the existing water cycle. This is important in ensuring that existing flood risks do not increase as a consequence of new developments and can provide the ability to

¹⁴ Flood and Water Management Act, HM Government, April 2010

reduce (or even eliminate) the need to use existing sewerage systems to convey surface water. This reduces unnecessary expenditure in the upgrading of existing sewers and WwTWs and reduces the probability of untreated discharges of wastewater during flood events and can delay the requirement to consent increased flows from WwTW.

2.1.2 Local

2.1.2.1 Core Strategy and Local Plan Review

The development plan for F&HDC comprises the Places and Polices Local Plan (2020) and the Core Strategy Review (CSR) 2022. The documents contain key policies relating to the water environment, whereby development should contribute to sustainable water resource management which maintains or improves the quality and quantity of water bodies.

The CSR 2022 identifies and defines proposed strategic site allocations to meet national policy for housing provision up to 2037. The requirement to commence a CSR was prompted by the findings of the 2017 Strategic Housing Market Assessment¹⁵ (SHMA) carried out jointly with Dover District Council.

Water of sufficient quality and quantity and in the right place is a growing issue, which needs to be addressed in planning for development. The impact and causes of climate change also need to be considered in the Council's plan-making process. A key purpose of this study is to review and integrate the approach to water supply, waste water treatment, flood risk issues and biodiversity.

F&HDC has adopted an optional building regulations water efficiency target of 110 litres/per person /day within its CSR. An extract of the proposed amended draft policy SS8 'New Garden Settlement – Sustainability and Healthy New Town Principles', drawn from the CSR 2022, is repeated below and will effectively guide the key water management requirements for Otterpool Park.

b. All new build housing shall be built to water efficiency standards that exceed the current building regulations so as to achieve a maximum use of 110 litres per person per day of potable water (including external water use). The development shall be informed by a Water Cycle Strategy which includes detail of:

i. Water efficiency, and demand management measures to be implemented to minimise water use and maximise the recycling and reuse of water resources (i.e. through the use of 'grey' water) across the settlement, utilising integrated water management solutions;

ii. The need to maintain the integrity of water quality, how it will be protected and improved, and how the development complies with the Water Framework Directive;

iii. Surface water management measures to avoid increasing, and where possible to reduce, flood risk through the use of Sustainable Drainage Systems (SuDS); and

iv. Water services infrastructure requirements and their delivery having regard to Policy CSD5, and as agreed with the relevant statutory providers, and the Environment Agency's guidance on Water Cycle Studies;

c. All proposed development will have to satisfy the requirements of policy CSD5 (d). in order to avoid any significant impact on the water quality of the Stodmarsh European designated sites.

d. For non-residential development, development shall achieve BREEAM 'excellent' standard including addressing maximum water efficiencies under the mandatory water credits;

2.1.2.2 Stodmarsh Nutrient Neutrality Guidance

There is currently uncertainty as to whether existing and new growth without appropriate further mitigation measures could deteriorate the integrity of the Stodmarsh Lakes European designated sites due to

¹⁵ F&HDC (Shepway) Strategic Housing Land Availability Assessment 2015/16, F&HDC (Shepway) 2016

eutrophication from extra nitrogen and phosphorus inputs. This uncertainty is one reason that the wastewater treatment works discharging into the River Stour and surroundings are currently subject to an investigation of their impacts and connection with Stodmarsh designated sites under the EA Water Industry National Environment Programme (WINEP) that will report in 2022. This WINEP investigation has been initiated to investigate potential links between the Stour and the Stodmarsh lakes systems, then propose appropriate, possible and cost-effective solutions to any identified impacts.

Until this work is complete, the uncertainty of new growth's impacts on designated sites remains, therefore there is potential for future housing developments (if unmitigated) within the Stodmarsh catchment to exacerbate the existing impacts thereby creating a risk to their potential future conservation status. To address this risk, NE has published Stodmarsh Nutrient Neutrality Guidance¹⁶ (November 2020) for the impacted Local Planning Authorities (LPAs), which sets out a practical and precautionary methodology for calculating how nutrient neutrality can be achieved. Therefore, this guidance has also been applied to Otterpool Park to ensure that there is no adverse impact to the integrity of Stodmarsh lakes deriving from the proposed Development. Section 4 provides further discussion on nutrient budget analysis and nutrient neutrality mitigation proposals at the proposed Development.

This methodology is based on best available scientific knowledge, and will be subject to revision as further evidence is obtained. It details a precautionary approach in line with existing legislation and case-law when addressing uncertainty and calculating nutrient budgets. This is to remove the uncertainty and subsequent risk, until any solutions are implemented the current adverse effects on Stodmarsh, is for new development to achieve nutrient neutrality. Assessing and mitigating nutrients is a means of ensuring that development does not add to existing nutrient burdens and this provides certainty that the whole of the scheme is deliverable in line with the requirements of the Conservation of Habitats and Species Regulations 2017¹⁷ (as amended) (the 'Habitats Regulations') and in light of relevant case law.

2.2 **Previous Water Cycle Studies**

The Kent Water for Sustainable Growth study¹⁸ (2017), which refers to Affinity Water's WRMP14¹⁹, concluded that to achieve water neutrality, demand after all planned houses in the LPA are built and occupied would need to be less than the currently used 16.14 Ml/d. This study concluded that it would require unrealistic measures to achieve this.

A WCS was initially produced for F&HDC in May 2011, an update to this document was published in 2019. F&HDC's WCS Update²⁰ (2019) examines the issues relating to water within the context of the District and the physical characteristics of its hydrology. One of the primary reasons for updating the WCS was to investigate the potential impact of new growth proposed under the adopted Places and Policies Local Plan and the CSR with corresponding plan periods up to 2031 and 2037 respectively.

The WCS Update²⁰ (2019) estimates the existing water demand (residential only) within the F&HDC LPA area as 16.14 Ml/d and the additional demand from projected residential growth is estimated to be 3.85 Ml/d. In line with the findings of the Kent Water for Sustainable Growth study, two more realistic water demand management scenarios were tested in the WCS Update (2019) and these are listed below:

• Mandatory requirements scenario plus retrofit – All new homes would be built to deliver a water use of 125 litres per person per day (Building Regulation Part G Mandatory); and, 5% of existing homes in the district would be retrofitted with low flush cisterns, as well as aerated taps and shower heads;

¹⁶ Stodmarsh Nutrient Neutrality Guidance, Landscape and Water Environment November 2020

¹⁷ Conservation of Habitats and Species Regulations 2017, HM Government November 2017

¹⁸ Kent Water for Sustainable Growth Study, KCC/AECOM May 2017

¹⁹ Affinity Water WRMP14, Affinity Water June 2014

²⁰ F&HDC Water Cycle Study Update, F&HDC, January 2019

 Optional requirements scenario plus retrofit – All new homes would be built to deliver a water use of 110 litres per person per day (Building Regulation Part G Mandatory²¹); and, 5% of existing homes in the district would be retrofitted with low flush cisterns, as well as aerated taps and shower heads.

The water neutrality analysis demonstrated that the optional requirement scenario would make some contribution to reducing the post-development demand (in 2031) within AW's current planned supply and demand balance. The mandatory scenario would potentially deliver a post-development demand reduction of 0.25MI/d (6% reduction in additional demand) while the optional requirement would deliver a potential reduction of 0.66 MI/d (17% reduction in additional demand). This highlights the importance of alternative strategic water resource options and demand management measures to be developed.

2.3 Water Resource Management Plan (WRMP)

The South East has experienced low rainfall in recent years, including dry winters. The 2013 EA classification confirms that both water supply areas that overlay F&HDC are ranked as being under serious water stress, meaning the South East regions do not have sufficient water for the whole of the 25-year planning period and therefore do not meet the customers demand for water. Expected climate change trends for the south-east are for drier summers, wetter winters, and more extreme events which also present possible issues in terms of water resources for AW. The District, with its important wetland habitats, is particularly susceptible to such changes and as such strenuous efforts are required to reduce the risk of water stress, especially in the European wetland sites.

AW is currently the supplier of potable water to F&HDC, along with South East Water, however, AW is the sole supplier of Potable Water to the area associated with the Otterpool Park, and the entirety of the study area is located within the WRZ7, which is also known as the Southeast region. WRZ7 abstracts 90% of the water supply from chalk and greensand groundwater boreholes with a minor component from the Denge gravels.

The AW Supply Zone is divided into eight WRZs which are broadly independent areas in which customers are supplied by a strategic pipe network from a number of local water sources. The WRZs also allow water to be transferred between zones to enable operational flexibility and are created as a strategic framework to facilitate assessment of the supply and demand. However, the Otterpool Park sits within AW's WRZ7, which is not directly connected to other AW WRZs, but small amounts of water are imported from the neighbouring South East Water and SW networks as discussed below.

The previous WRMP14, published by AW in 2015 concluded that there was not enough water to meet demand in all of the operating areas, and therefore options appraisal had been undertaken to consider ways to resolve the deficits. Feasible options to balance supply and demand included schemes to reduce leakage and implementing other water efficiency measures. These were consistent with Government aspirations to reduce per capita water consumption. AW identified possible schemes to provide additional water resources from groundwater, surface water and transfers from neighbouring water companies and third parties within, and in close proximity to, their boundaries. AW balanced supply and demand with a combination of options that had been identified through modelling and then validated through customer consultation. In general, across the aquifers, the 2005/06 water levels were more extreme although at a few sources the 2011/12 levels were lower and the Deployable Outputs values were modified at these sources. Within WRZ7, adjustments had been made in terms of source performance and for environmental reasons, which had resulted in some sustainability reductions, requiring additional measures within those areas to ensure the demand is met.

AW has since published the final WRMP²² (WRMP19) in April 2020, which describes how the supply-demand balance from AMP7 (2020-25) onwards will be maintained till 2080. Arcadis and F&HDC have been closely engaging with AW since 2017 to ensure that the Otterpool Park is fully accommodated within WRMP19 proposals. The following latest information is provided by the WRMP19.

Table 3 below details the deployable output for WRZ7. Deployable output (DO) is the term used to define how much water can be abstracted reliably from a source during a dry year and delivered into the supply. It is measured in megalitres per day (MI/d) and it is evaluated as an average DO over the whole year (known as

²¹ Building Regulation Part G - Sanitation, hot water safety and water efficiency, HM Government 2015

²² Water Resources Management Plan (2020 – 2080), Affinity Water April 2020

average DO or ADO) and during critical periods (typically a seven-day period) when demands are at their highest (known as peak DO or PDO).

Table 3: Deployable Output in Water Resource Zone 7

1 in 200 annual	1 in 500 annual	1 in 200 annual	1 in 500 annual
chance Average	chance Average	chance Peak	chance Peak
Deployable	Deployable	Deployable	Deployable
Output (MI/d)	Output (MI/d)	Output (MI/d)	Output (MI/)d
46	46	55	51

WRZ7 currently benefits from the following two existing bulk transfer agreements shown in Table 4. The volumes stated are the available capacity under the applicable agreement or arrangement, rather than utilisations which can vary depending on needs.

Table 4: Existing bulk transfer capacities in WRZ7

Providing Company	Receiving Company	Maximum Capacity At Average (MI/d)	Maximum Capacity At Peak (MI/d)
South East Water	Affinity Water WRZ7	2.0	2.0
Southern Water	Affinity Water WRZ7	0.0714	4.0

WRMP19 provides the baseline supply-demand balances at Dry Year Annual Average (DYAA) and Dry Year Critical Period (DYCP) for the Southeast region (WRZ7) as shown in Table 5. WRMP19 forecasts a population growth of approximately 13% by 2025, 32% by 2045 and 64% by 2080, equivalent to over 100,000 more people living in WRZ7. This growth in demand results in the small surplus of 1.3 Ml/d under average conditions in 2020 moving to a small deficit of 0.1 Ml/day under average conditions in 2045 to a larger deficit of 4.3 Ml/day under average conditions in 2080. WRMP confirms that there are no planned sustainability reductions in WRZ7 at average or peak conditions. It also shows that no noticeable long-term climate change impact is expected on supply in WRZ7.

Table 5: Estimated Baseline Supply Demand Balance in WRZ7 for DYAA and DYCP

DYAA or DYCP	2020/21 (MI/d)	2045/46 (MI/d)	2080/81 (MI/d)
DYAA	1.3	-0.09	-4.28
DYCP	-0.65	-3.75	-11.18

The key objectives of the WRMP19 are outlined below, however, some of these may not be fully applicable to WRZ7 (e.g. water metering as this is already extensively implemented in WRZ7):

- Continue to work collaboratively with other water companies in our regions, in order to share water resources and promote regional coordination. For example, reducing the import of water from Anglian Water allowing Anglian Water to utilise more of this resource;
- Reduce leakage from water pipes where the savings justify the expenditure and to meet customer expectations;
- Continue to promote water efficiency to support customers to reduce demand;

- Facilitate economic growth by planning for housing and population needs; and
- Extend customer water metering and promote smart metering innovation, where it is cost beneficial.

WRMP19 confirms that the majority of the deficit in WRZ7 can be managed through the demand management measures, plus extension of AW's bulk supply arrangements with South East Water and SW shown in Table 4 before. Some licence changes and infrastructure schemes are still required (e.g. removing constraints around AW's Dover source and strengthening the network around Broome), primarily to address needs during periods of peak demand. A summary of the proposed supply side schemes are timings is provided in Table 6 below.

 Table 6: Summary of proposed WRMP19 supply side developments in WRZ7

Scheme Name	Date Required	Deployable Peak Output (MI/d)
Lye Oak Variation	2021	0.14
Tappington South Licence Variation	2044	0.7
Broom Network Improvement	2066	2.27
Dover Constraint Removal	2022	1.32
Barham Import increase (of 2 MI/d) to 4 MI/d	2057	2
Deal Continuation After 2020	2020	0.0714
Barham Continuation (After 2019/20)	2020	2

The final supply/demand tables in WRMP19 show that WRZ7 will have sufficient water till 2080 for both average conditions (DYAA) and peak conditions (DYCP).

Due to the scale of the Otterpool Park, the proposed housing allocation of 8,500 dwellings by 2042 (covered in this amended Planning Application) and a total of 10,000 dwellings by 2044 (including potential future development in wider masterplan area) are being included and assessed by AW in the updated WRMP19. The impact on water resources and infrastructure as a result of new development within the District does not solely depend upon the number of new dwellings constructed. Demographic changes, i.e. changes in population and occupancy rates, will influence the impact of each new dwelling. Behavioural changes such as changes in per capita consumption (PCC), in both new and existing dwellings, will also affect the impact that the development has on the water infrastructure.

Section 3 provides further discussion on water resources and supply considerations and impacts from Otterpool development, based on the WRMP19 findings and latest engagement being undertaken with AW.

2.4 Abstraction Licensing Strategies (ALS)

The EA monitors existing abstractions so as to understand the water balance within catchments and what water may be available for future use. The EA prepares Abstraction Licensing Strategies (ALS) to make sure there is enough water for people and the environment.

ALS assess the amount of water available in each river catchment and review all abstraction licenses to determine whether or not they are having an unsustainable impact on the environment. The ALS help to identify where water may be available for future use but also where water resource demands may be impacting the water balance and no further water is available for abstraction. There is one main strategy which covers the study area and the details are contained in Table 7.

Table 7	Abstraction	Licensina	Strategies	Summarv
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ALS catchment	WRMU reference	Resource Availability Status
Stour	River East Stour and tributaries, Upper River Stour	Surface Water- water available for licensing during high flows. No water available for licensing during low flow. Groundwater- water available for licensing during high flows. No water available for licensing during low flow. Overall consumptive abstraction availability is at least 30% of the time

The ALS indicate that overall no further consumptive licences will be granted for the existing groundwater or surface water sources. There is no further water for abstraction as overall further abstraction would result in an unsustainable impact on the environment. Water companies may be able to 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder. In terms of groundwater, the Stour Catchment is important as it contains the principal aquifers that supply the wider District with water.

In summary, with no further licences being granted within the majority of F&HDC water efficiency measures relating to the existing supply will need to be implemented to safeguard water supplies into the future. Further sustainability reductions may be required in the future to support the aspirations of the Water Framework Directive²³ (WFD) (2000). Development of additional resources, or increased efficiency through demand management, will be required to maintain the supply required for new developments. Additional potable water demand for the Otterpool Park will be met by AW from the surplus water available elsewhere in WRZ7, in conjunction with the development of additional sources in the long-term, as discussed in Section 3.

2.5 River Basin Management Plan (RBMP)

River Basin Management Plans (RBMP) have been developed by the various regional offices of the EA and were published in 2009 and updated in 2015. The current RBMP is being updated and the final plan is due to be published in 2022. The RBMPs set out a strategy, including a Programme of Measures, for each catchment to comply with the requirements of the WFD. The WFD applies one of five statuses to a waterbody; Bad, Poor, Moderate, Good and High, with Bad status showing severe change from natural conditions as a result of human activity and High meaning that the water body is reaching near natural conditions. An assessment of the current status of the rivers has been made, showing the rivers and lakes that currently fall below the 'good' status required to meet the WFD targets. The documents then set out those rivers that should be at 'good' status by 2027. As with the ALS designations, Otterpool Park falls within the Stour catchment. Further information on the WFD, the current status, and future targets is included in Table 8.

 Table 8: River Basin Management Plan Status Summary

Catabraat	RBMP Cycle 2 2016				
Catchment Sub Catc	Sub Catchment	Overall Status	Ecological Status	Chemical Status	Objectives
South East	River East Stour	Moderate	Moderate	Good	Good by 2027

The major impact of the Otterpool Park on the water environment will be the variations in water quality and quantity discharged to receiving watercourses from the development itself (surface water runoff) and the

²³ The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, HM Government, April 2017

WwTW that serves the development. Water discharged from the development will require careful management to ensure that the development does not have a detrimental impact on the water environment.

2.6 Surface Water Management Plan (SWMP)

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location. SWMPs are undertaken, when required, by Lead Local Flood Authority (LLFA) in consultation with key local partners who are responsible for surface water management and drainage in their area. SWMPs establish a long-term action plan to manage surface water in a particular area and are intended to influence future capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning and future developments.

The eastern portion of the proposed development is covered by the Folkestone and Hythe SWMP²⁴ and the site falls within the DA01 Drainage Area. There were no specific actions or issues identified in the SWMP for the Otterpool Park. A generic priority action was to ensure new developments incorporate SuDS in accordance with the NPPF and to increase awareness of the benefits of SuDS and water recycling. This priority action is relevant to the Otterpool Park.

2.7 Catchment Flood Management Plan (CFMP)

Catchment Flood Management Plans (CFMP) are high-level policy documents covering large river basin catchments prepared by the EA. They aim to set policies for sustainable flood risk management for the whole catchment covering the next 50 to 100 years.

The Otterpool Park falls within the Stour CFMP. CFMPs split their catchments into sub-areas with similar flood risk management types and assign one of six policies to each sub-area. Table 9 summarises the policy statements relating to the Upper Stour sub-catchment, which the proposed development falls within.

Table 9: Catchment Flood Management Plan Summary which covers Otterpool Park

CFMP	Sub Area	Policy
River Stour	Upper Stour	Policy 6- Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

Action and objectives are then identified for each sub-area based on the policy assigned. These actions have been summarised in Table 10. Despite the different policies, all areas have been identified as rural areas of low to moderate risk and therefore there are some common themes in the proposed actions, most notably the need to maintain flood defences and improving floodplain connectivity.

Table 10: Catchment Flood Management Plan Policy Summary applicable to Otterpool Park

CFMP	Policy	Actions
Divor	Policy 3	Develop a System Asset Management Plan (SAMP) to ensure existing defences are in good condition and able to accommodate increased flooding due to climate change.
River F Stour		Carry out Upper Stour Strategic Review, a wider study from Upper Stour to Wye, exploring options for flood risk management including looking for opportunities for increasing floodplain connectivity, storage and attenuation.

²⁴ Folkestone and Hythe SWMP, JBA 2012

These wider policies are applicable to the Otterpool Park, and it is important that it seeks to manage surface water run-off to provide overall flood risk reduction or benefits.

2.8 Strategic Flood Risk Assessment (SFRA)

A Level 2 SFRA⁶ for F&HDC was completed in 2015. The SFRA identified that a large proportion of the district is low-lying, with tidal inundation presenting the source of the most significant flood risk. Approximately 55% of the district's total area lies within Flood Zone 3a, an area considered to be at high risk from flooding. However, most of the residential areas and the fertile (yet low-lying) arable farmland that covers much of the district are generally well protected from flooding by tidal defences. These are either formal hard engineered structures or are formed by natural shingle barrier beaches that are actively managed to reduce the risk of breaching.

Many of the settlements across the district have experienced flooding in the past, including (but not limited to), Hythe, Folkestone, Newington and Etchinghill. Sources of past flooding have been predominantly from main coastal flooding, ordinary watercourses and surface water.

However, no historical flooding was listed for the Otterpool Park. The Stage 2 SFRA concluded that the Folkestone and Hythe District is generally located within a low-risk area in terms of groundwater flooding and has not specifically identified any risk within the area impacted by the proposed Development.

3 Water Resources and Supply

This section further discusses the relevant water resources and supply issues and recommendations for the proposed development area, by building on the initial discussion given in Section 2.

On a strategic level to meet the demand of the new developments within the F&HDC District, water will need to be continued to be brought into the catchment by AW. This is already the case, with water moved around the network to ensure demand is met resiliently. Strategic network reinforcements will be required to facilitate this increased demand. On a more granular level, local network reinforcements will be required to supply the development, and where necessary new mains will need to be laid to provide connections. Behavioural changes such as changes in per capita consumption (PCC), in both new and existing dwellings, will also affect the impact that development has on the water infrastructure.

A summary of PCC figures used in this updated WCS assessment are provided in Table 11 below.

Table 11: Otterpool per capita consumption Demand Scenarios

Scenario	PCC for New Dwellings	PCC for Commercial Buildings
D1	110 l/p/d – As defined by Building Regulations optional requirements and F&HDC CSR Policy SS8	PCC rate for commercial buildings is estimated in accordance with British Water Code of Practice: Flows and Loads – 4 (Latest Edition, 2013).
D2	125 l/p/d – As defined by Building Regulations minimum requirements.	PCC rate for commercial buildings is estimated in accordance with British Water Code of Practice: Flows and Loads – 4 (Latest Edition, 2013).

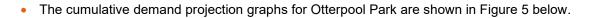
3.1 Water Demand Impacts

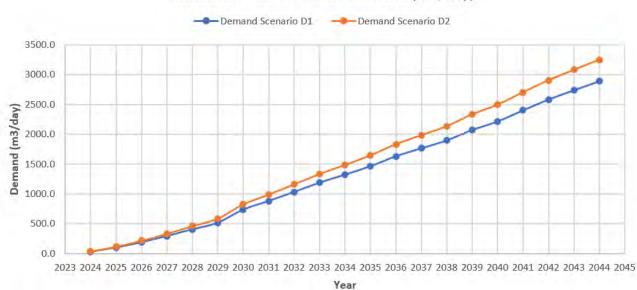
In order to assess the assumed development trajectory's (see and Appendix A) impact on extra water demand the following equation was used:



The key assumptions applied include:

- Water distribution leakage values have been discounted from the baseline demand calculation;
- Occupancy has been assumed to remain at a flat rate of 2.4 for new dwellings across the assessment period;
- PCC rate for residential homes for each demand scenario is taken as per Table 11; and
- PCC ate for commercial buildings is taken from British Water Code of Practice: Flows and Loads 4 (Latest Edition, 2013), but only a selected commercial land use types and % of areas are added to the domestic water consumption demand to avoid double counting. This is because the majority of the new jobs will be fulfilled by the local residents of the Otterpool Park itself. Therefore, other uses such as Hotel (Class C1) and other non-residential uses (e.g., Classes E, F, B2 and Sui Generis) have been included in addition to the domestic water demand.





Cumulative Potable Water Demand (m3/day)

The projections show that there is a variation between scenarios with a final difference of 360 m³/day between the two scenarios at the full completion of the Otterpool Masterplan Framework development in 2044. Table 12 provides an overview of the total extra potable water consumption within the development for each scenario shown in Figure 5 above.

Scenario	Domestic Demand (m³/day)	Commercial Demand (m³/day)	Total demand (m³/day)
D1 (110 l/d/p)	2,640	248	2,888
D2 (125 l/d/p)	3,000	248	3,248

Table 12: Otterpool Park Extra Cumulative Potable Water Demand Summary (by 2044)

Phase 1 development is expected to be fully completed by 2030, which includes approximately 1,975 homes and associated commercial development. The total potable water demand by 2030 is estimated as 738 m³/day and 826 m³/day for scenario D1 and D2 respectively.

AW published WRMP19 (2020 – 2080) in 2020 and this is based on an estimated PCC of 124 l/p/d at the zonal level for new properties. AW also adopted this PCC figure to assess the necessary infrastructure needed to transfer water from source to the point of use at Otterpool Park. However, AW has used a per property figure of 450 l/property/day, which includes a Factor of Safety to allow for a certain level of daily and seasonal peak usage.

AW has carried out significant work to ensure that a sustainable and resilient water supply is available for this area. AW has adopted the latest plan-based forecasts (including the entire Otterpool Framework Masterplan Area) in its technical assessment for the Dour community (Water Resource Zone 7) up to 2080 for the WRMP19, where the proposed Development is located. Based on these, Water Resource Zone 7 is not currently predicted to enter a supply deficit until 2044/45 under the Dry Year Annual Average (DYAA) conditions. The final supply/demand tables in WRMP19 also show that WRZ7 will have sufficient water till 2080 for both average conditions (DYAA) and peak conditions (DYCP). The proposed WRMP19 supply side

Figure 5: Otterpool Park Demand Projections 2024 – 2044

development schemes shown in Table 6 for WRZ7, have been already informed by a strategic environmental assessment and technical studies.

Therefore, AW has sufficient water resources to supply the whole Otterpool Framework Masterplan Area involving 10,000 homes. Based on the currently known development forecast AW has confirmed there is water supply infrastructure capacity for the early phase(s) of Otterpool Park, of approximately 1,500 additional residential units (i.e. until 2028) over-and-above the remaining quantum of growth modelled for in the latest WRMP19 forecasting. However, an offsite infrastructure upgrade will be required to accommodate the remaining Otterpool Park. This will include the construction of approximately a 11 km long, 560 mm diameter, new dedicated distribution main from Paddlesworth Reservoir to Otterpool Park, which involves the crossing of M20 and CTRL that may involve construction methods such as micro tunnelling, to minimise construction impacts. AW has confirmed that the required reinforcement can be planned and implemented ahead of the remaining development through the normal water industry's five-yearly business planning process.

The final route alignment and construction details will be determined by AW in the current AMP7 cycle (2020-25), as informed by future Environmental Impact Assessment and technical appraisals, minimising the potential environmental and construction impacts. As indicated in the Utility Strategy²⁵, the proposed offsite water main is likely to follow the route of existing main from the Paddleworth Reservoir and the routing to the point of water supply connection for Otterpool Park will be from the east.

AW has also confirmed that further work has been completed since 2017 to sustain the planned developments and improve resilience the existing customers, including the strategic plans for the future network reinforcements that will be required to service future development in the area.

AW currently has two large reservoirs, serving this part of the operational area that will also serve the Otterpool Park. These reservoirs are supplied by multiple, treated water sources and linked through a recently completed strategic transfer pumping station. Resilience is achieved by having flexibility to supply these treated water storage reservoirs and the transfer capability. Therefore, the proposed Development will be served from these reservoirs depending on the operational regime adopted. There are currently no plans for further strategic storage for the region, although AW will continue to examine future resilience needs in this operational area (e.g. upgrade to Paddlesworth supply reservoir).

The F&HDC WCS²⁰ recognises that there is also an opportunity for Otterpool Park to take an innovative approach to water supply and wastewater treatment through the endorsement of a site-wide integrated water system and smart technologies, to endorse the principles of water re-use and water recharge within the site boundary. F&HDC Core Strategy Review Policy SS8 (2022) endorses the need for an integrated water management approach to be applied and that domestic PCC should be limited to a maximum of 110 l/p/d.

AW strongly encourage policies which require all new developments to meet the highest water efficiency standards. The South East of England is a heavily water-stressed area, so this is well justified. Further discussion on how the Otterpool Park is planning to achieve this is given in the following sections.

3.2 Water Efficient Technologies

To achieve the required PCC target of 110 l/d/p under F&HDC Core Strategy Policy SS8 (2022), every residential property should include the following water efficiency measures as a minimum as per Building Regulations Part G2 optional standard requirement:

- 4.0/ 2.6 I for dual flush toilets;
- 8 l/minute for showers;
- 170 I for bath;
- 5 l/minute for basin taps
- 6 l/minute for sink taps
- 1.25 l/place setting for dishwasher; and

²⁵ Utility Strategy, Arcadis March 2022 (ES Appendix 4.8)

• 8.17 l/kilogram for dishwasher.

In addition, a 210 I standard water butt for each property is recommended.

For all non-residential properties (i.e. where applicable), in order to reduce whole building potable water usage development and therefore achieve the maximum water efficiencies under the mandatory water credits/ BREEAM 'Excellent' standard, the following fixtures and fittings should be provided:

- 4.0/2.6 I for dual flush toilets;
- Dry urinal systems;
- Kitchen and bathroom taps limited to 5 l/minute and 3 l/minute respectively; and
- 3.5 l/minute showers.

(However, where appropriate higher flow devices might be required for non-residential properties. Should be provided where this is appropriate.)

Other water efficiency technologies that have also been considered at Otterpool Park to exceed the required 110 l/p/d CSR SS8 policy target (with 2021 Main Modifications), as part of the proposed integrated water management solutions include:

- Rainwater harvesting at property level or community level for non-potable usage the limited rainfall in Kent and longer drier periods along with cost constraints of providing large storage facilities to accommodate such practical considerations will limit the effectiveness and financial viability of delivering such measures across Otterpool Park. However, targeted intervention can be further explored where appropriate (e.g. schools, public buildings and high density development plots);
- Rainwater harvesting from strategic SuDS facilities for non-potable usage the limited rainfall available in south Kent and additional space/storage and dual plumbing requirements plus extra financial costs will be a significant constraint again. Therefore, targeted intervention can be further explored (e.g. where larger existing and proposed water bodies are located);
- Monitor water usage, quality, and climate change impacts at all stages of the design-life of the proposed Development through smart metering. This should be combined with other smart home and office systems to give wider utility control and customer behaviours – e.g., educational and behavioural initiatives, network sensing to reduce network losses and improve efficiency, micro-controlled irrigation and smart irrigation systems); and
- Reclaimed wastewater recycling or 'grey water' recycling to provide some of the nonpotable water demand – this option has been previously considered, but has been discounted now (i.e., in particular for the initial development phases) due to the higher financial, technical and operational risks when compared to the available other costeffective rainwater harvesting methods above.

Local groundwater abstraction from new boreholes at a large scale would not be permitted as the local principal aquifer is over abstracted and its WFD quantitative status is classified as poor.

Local rainwater harvesting has many benefits including:

- Allowing valuable water resources to remain in the environment;
- Offsetting potable water use;
- Reducing net energy use by eliminating the need for additional treatment and associated transportation costs of potable water; and

• Reducing peak potable water demand.

Further discussion on the potential integrated water management solutions is given in Section 5. However, centralised rainwater or reclaimed wastewater harvesting will require a dual plumbing system in each household and a strategic distribution network from the recycled facility to each property. Therefore, this will increase initial capital cost for the development. Therefore, this solution is to be assessed further in terms of Life-Cycle cost and practicality within the detailed WCS for each phase of the Otterpool Park.

3.3 Sustainable Drainage Systems Infiltration for Water Supply Benefits

As mentioned before, the development is situated in a location which is known to have limited groundwater resources and is considered a water-stressed area. As part of the SuDS concept strategy and design development, consideration has been given within the masterplan as to how SuDS could be implemented with the aim to recharge the limited groundwater supplies, which will serve a dual benefit as this will also reduce the flood risk and the amount of surface water above ground.

This can be achieved through the implementation of SuDS strategies, which allow the water to infiltrate into the soil subject to the presence of suitable permeable ground coverage and depth. It is intended to promote the natural infiltration of water into the ground via swales, rain gardens, infiltration basins and wetlands. They can also encourage the base flows in the receiving watercourses to help to address the existing low flow issues during drier summer periods. However, this approach requires the surface water to be sufficiently treated before it is discharged and stored within the aquifer, this again can be achieved naturally through a 'treatment train' with a series of inter-linked SuDS. This treatment train allows runoff to be treated at the source, by allowing heavy metals and other pollutants to settle and separate from the runoff before discharging into the main watercourse.

Using a natural method such as infiltration basins and bio retention features is consistent with the garden settlement theme of the development and forms part of the surface water management strategy masterplan. Soakaways, permeable paving, swales, detention and infiltration basins as well as ponds and wetlands are located at multiple areas of the proposed development.

This is to contribute to the strategic objectives and desired effect of the SuDS design which is to ensure green space and properly landscaped SuDS are allocated to permeate the development providing aesthetic, biodiversity and education benefits to residents and surrounding communities, while providing the most efficient multifunctional form of SuDS. Water sensitive and attractive blue-green infrastructure proposals have been proposed across the Otterpool Park working closely with the landscape architects, master planner and ecologists to ensure water is a key defining feature in the landscape and place making process to maximise flood risk and non-flood risk benefits to the communities.

The infiltration-based SuDS measures require permeable and unsaturated zones to convey the water into the underlying soils and to the aquifer, and have sufficient capacity for lateral flow to prevent excessive groundwater mounding. Parts of the site is covered by freely draining soils which create good permeable conditions for the first stages of the infiltration. The underlying bedrock of the site consists of the Hythe Formation, which due to its limestone content presents as an efficient aquifer. The Hythe Formation is a suitable aquifer as it exhibits both fracture flow in cemented sandstones and intergranular flow through poorly consolidated sands. This could prove to have a capacity for further groundwater storage and would provide a porous storage area. However, the Hythe Formation presents difficulties with construction and infiltration as this formation is prone to solution features.

As mentioned in Section 3.2 above, there is further potential to harvest rainwater from the larger existing waterbodies and proposed water features/ SuDS at targeted locations, making an extra contribution to meet the non-potable water demand and therefore helping the development achieve its sustainability and water neutrality aspirations at Otterpool Park. Section 5.0 provides further discussion on this.

3.4 Summary

AW has sufficient water resources to supply the whole Otterpool Framework Masterplan Area involving 10,000 homes, but the key issue is to bring this water from their Dover and Folkestone supply zones to Otterpool Park. AW has adopted plan-based forecasts in their technical assessment for the Dour community (Water Resource Zone 7) up to 2080 for its Water Resource Management Plan 2019. Based on these, Water Resource Zone 7 is not currently predicted to enter a supply deficit until 2080 and the proposed WRMP19 supply side development schemes have been already informed by a strategic environmental assessment and technical studies.

The point of connection will be at various locations along the existing A20, with spine mains emanating off the points of connection to create ring mains within the respective development phases. In order to reduce the number of offsite mains needed for the Otterpool Development, AW will need to reconfigure the network to suit.

The full length of the 11 km water main will not to be in place until 1501st occupation and as such, AW has confirmed the following infrastructure phasing strategy to serve the full 8,500-unit development:

- The first 1,500 properties can be provided by the existing system. This is because by utilising the spare capacity, a dedicated water main would not need to be in place until 2028 (i.e., assuming an onsite construction start date in 2023 and first occupation in 2024) with a build rate of 300-450 units per annum;
- 2. The next Phase of work will involve a new pipe (11 km long, 560 mm diameter) up to and beyond the HS1 crossing and the M20 (although the actual crossings could come later) to release capacity from Paddlesworth Reservoir for a significant number of properties, currently estimated at 6,000; and
- 3. The final phases of the works will be to complete the local network reinforcement around the crossings and tie in with one of AW higher strategic pressure mains, including carrying-out local reconfiguration of the network to release capacity for up to 10,000 properties (i.e., from Paddlesworth Reservoir or multiple storage assets in the WRZ7) and ensure a sustainable and resilient supply is available for Otterpool Park and wider area.

Significant design work and network modelling is required before Affinity Water is able to estimate the potential cost, delivery timeframes and construction details of the full network upgrade scheme, but the costs will very likely be recovered as a contribution associated to each new connection as opposed to a single high-value contribution by the developer. The first phase can be implemented by 2024. The indicative implementation programme for the second phase (i.e., from the start of planning through to construction completion) is 4-5 years to allow for the two crossings of strategic infrastructure by AW, including the associated environmental assessment and technical appraisals. Therefore, this upgrade can be planned in AMP7 cycle (2020 - 25), the second phase can be implemented prior to 2028 within the next AMP8 cycle (2025-30) and the final phase can be implemented in AMP9 cycle (2030-35).

Ofwat has revised the way that Infrastructure Contributions are calculated for all new connections and subsequently invested by the water undertakers. The new water main is classified as a 'site-specific off-site main' and according to AW charging rules, a 10% offset contribution is required from the Developer.

As Otterpool Park is located in a water-stressed area, further water efficiency measures will be put in place to manage the amount of extra drinkable water consumed by each new household to 110 litres of water per person, per day as per the modified CSR Policy SS8 (with 2021 Main Modifications). This PCC target can be achieved using the water efficient fittings described in Section 3.2 alone. However, it is recommended further assessment is undertaken as part of the development planning process to cover the detailed requirements of delivering and monitoring such measures, including whether rainwater harvesting can be implemented at targeted locations to exceed the current PCC target of 110 l/p/d, where this is practical and viable.

Water management at the Otterpool Park can also help to deliver other objectives for the development including a sense of place, green infrastructure, biodiversity, education and awareness, and water sensitive behaviour. Early consideration of water management provides the opportunity to integrate the water environment into the local context and character of the area, enriching both the natural and built environment.

By fully integrating the management of water and by considering all space as potentially multifunctional, water management systems can be used to enhance development viability through the delivery of the design criteria.

This can result in a number of benefits:

- Additional supply of water resources, to improve water security;
- Higher value amenity, recreation and education facilities within public open space;
- Improved habitats and biodiversity;
- Improved climate resilience;
- Reduced pressure on water infrastructure and reduced surface water flooding;
- A mechanism for enhancing and defining the quality, character and visual aesthetics of both the built environment and green/ open space;
- A surface water management system that can be easily maintained and cost-effectively maintained; and
- Flood risk reduction or betterment within Otterpool Park and downstream.

Therefore, water sensitive and attractive blue-green infrastructure proposals that promote a lowcarbon and highly sustainable development is a key theme in the Otterpool Park to create place making and maximise flood risk and non-flood risk benefits of the proposed development. Surface Water Management Strategy, Green Infrastructure Strategy (ES Appendix 4.11), Strategic Design Principles (ES Appendix 4.3) and Design and Access Statement (ES Appendix 4.16) fully explore

4 Wastewater Treatment and Sewerage

4.1 Existing Situation

Wastewater treatment and conveyance within the Otterpool Park and the wider District is managed by SW, a simplified overview map of wastewater collection and treatment assets in this area is provided in Figure 6 below.

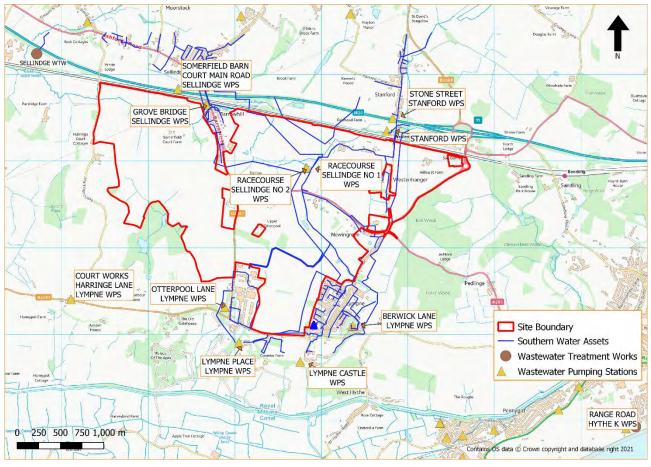


Figure 6: Wastewater collection and treatment assets. (The planning Application Site boundary is outlined in red.)

There are existing operational SW wastewater assets on the site that serve the wider catchment. Arcadis has explored the potential to use this existing infrastructure to serve the initial phases of the development, but currently insufficient extra capacity is available for this. Significant lengths of the existing rising mains and gravity network will also need to be diverted to facilitate development build-out, as much of this existing infrastructure currently sterilises developable land, which can be seen on Figure 6 above.

The nearest WwTW is located at Sellindge, north of HS1 railway line to the north-west of the Otterpool Park. A Pumping Station (PS) is currently located on the existing racecourse within SW owned land, within the redline boundary extent, which takes flows from the existing wider catchment. The existing Racecourse Pumping Station (PS) is connected to the Sellindge WwTW by a series of rising mains and gravity sewers, which extend north to the northern boundary of the site and cross under the HS1 railway and M20 before heading west along A20, into Sellindge WwTW.

SW has advised that Sellindge WwTW has headroom for approximately 1,000 new household units before a significant upgrade will be required to accommodate the additional flows from the proposed Development, but the required upgrades are still possible within the boundary of land owned by SW at the location of the works. SW has also advised that significant offsite reinforcement will be required to connect the development to the

existing network. A feasibility study²⁶ was completed in 2019, which assessed the current Racecourse and Grove Bridge PSs, rising mains and the receiving gravity network as well as the upgrade requirements at Sellindge WwTW to accommodate Otterpool Park. This feasibility study concluded that no capacity for additional flow from the Otterpool Park is currently available at Racecourse PS and there are no planned upgrades or maintenance works to this PS in the short term. SW has also confirmed that there is capacity for only 163 new homes at their Grove Bridge Sellindge PS for the initial phases at Otterpool Park.

Discussion on the potential sewerage and WwTW options are discussed below. Therefore, in order to confirm the impact of the proposed Development, the following aspects have been assessed as part of this WCS:

- Impact of development trajectory on volumetric discharge in terms of Dry Weather Flow (DWF) in relation to existing WwTW discharge consents;
- Identification of WwTWs which require upgrading or where upgrades are not feasible or preferable, identification of potential for new WwTWs;
- Identification of key wastewater and environmental constraints;
- Commentary on the sewerage network constraints; and
- Recommendations for mitigation solutions and future detailed studies.

4.2 Otterpool Flow Loading Projections

As mentioned before, the proposed development consists of 8,500 dwelling units up to the year 2042 (within the Application Site), with an additional 1,500 units from 2042 to 2044 (within wider masterplan area), taking the total to 10,000 units.

A recognised methodology has been applied to calculate the wastewater generated from the development as follows:

Where

Total DWF = Existing DWF + New DWF

DWF = PG (population equivalent × PCC) + I (infiltration) + E (trade flow)

The maximum PCC rate stated in the recently amended Policy SS8 for new dwellings is now 110 l/p/d, which is below the maximum requirement for Building Regulations (125 l/p/d).

The baseline DWF has been calculated using the measured DWF provided by SW for the existing Sellindge WwTW whereas the increased DWF from the proposed Development in this WCS is calculated using the following criteria:

- PCC rate for residential dwellings is taken as 110 l/p/d to estimate the "Lower Bound DWF" for the EA discharge permit analysis purpose;
- PCC rate for residential dwellings is taken as 130 l/p/d to estimate the "Upper Bound DWF" for preliminary WwTW treatment capacity design and worst case for the EA discharge permit analysis purpose;
- PCC rate for commercial buildings is estimated in accordance with British Water Code of Practice: Flows and Loads – 4 (Latest Edition, 2013). However, only a small % commercial land use types and areas is added to the domestic DWF loading to avoid double counting. This is because the majority of the new jobs will be fulfilled by the future occupants of the Otterpool Park itself;
- An average household occupancy rate of 2.4 is assumed as per the Otterpool masterplan;
- An infiltration rate allowance is assumed as 10%, reflecting new construction status of the sewers in line with SW general developer services modelling guidance; and
- No additional trade flow is added as trade flow permits are not expected at the proposed Development.

²⁶ Otterpool – Growth Study, Southern Water June 2019

However, WwTWs typically discharge up to three times their DWF (referred to as Flow to Full Treatment – FFT) at peak. An increase in FFT, due to growth in the catchment, may increase the flood risk to properties and environmental sites on the watercourse downstream of the discharge point.

	Total FFT = Existing FFT + New FFT
Where	FFT = 3 x PG (population equivalent × PCC) +I (infiltration) + E (trade flow)

Table 13 shows Lower Bound and Upper Bound DWF and FFT estimates for Otterpool Park Tier 1 OPA and Framework Masterplan.

Table 12: Extra	DW/EL anding P	Projections From	Dranasad	Dovolonment
TADIE IS. EXITA	DWF Loading P	rojecilons From	FIODOSEC	Development

	Otterpool Park Tier 1 OPA		Otterpool Park Framework Masterplan		
Flow Loading Type	Lower Bound DWF (m ³ /day) – with domestic PCC rate of 110 I/p/d	Upper Bound DWF (m ³ /day) – with domestic PCC rate of 130 l/p/d	Lower Bound DWF (m ³ /day) – with domestic PCC rate of 110 l/p/d	Upper Bound DWF (m ³ /day) – with domestic PCC rate of 130 l/p/d	
Domestic	2,244	2,652	2,640	3,120	
Commercial	248	248	248	248	
Domestic + Commercial	2,492	2,900	2,888	3,368	
Infiltration (@ 10%)	249.2	290.0	288.8	336.8	
Total DWF	2,741.4	3,190.2	3,177.0	3705.0	
Total FFT	7,725.6	8,990.4	8,953.2	10,441.2	

However, an extra 350 new dwellings are also proposed at Sellindge Phase 2 Sites (CSD9A and CSD9B) as part of F&HDC CSR, which will generate following extra DWF and FFT values (inclusive of 10% infiltration allowance) if they are included within the WwTW and nutrient mitigation options discussed below:

- Lower Bound DWF 101.6 m³/day;
- Upper Bound DWF 120.1 m³/day;
- Lower Bound FFT 286.4 m³/day; and
- Upper Bound FFT 338.5 m³/day.

4.3 **Preliminary Wastewater Treatment Options**

Three options have been considered for the treatment of the wastewater generated by the Otterpool Park development. There are two potential options to discharge offsite, one option is to utilise Sellindge WwTW, located 1 km to the north west, and a second option is to connect, via the Range Road PS, to West Hythe WwTW, located approximately 7 km to the south-east. An onsite WwTW is also considered as discussed below.

4.3.1 **Option 1 – Southern Water Sellindge Wastewater Treatment Works**

Under this option, all the wastewater from Otterpool Park would be disposed of to the Sellindge WwTW operated by Southern Water. Southern Water have confirmed that it is possible to upgrade the Sellindge WwTW to accommodate flows from the development and that the capital cost for undertaking these upgrade works will be normally met by Southern Water.

4.3.2 **Option 2 – Onsite Wastewater Treatment Works**

Wastewater generated by the Otterpool Park development can also be treated on site. This will be facilitated through the engagement of a New Appointment Variation (NAV).

NAV are limited companies which provide a water and / or sewerage service to customers in an area which was previously provided by the incumbent monopoly provider. A new appointment is made when a limited company is appointed by Ofwat to provide water and/or sewerage services for a specific geographic area.

4.3.3 **Option 3 – Southern Water West Hythe Wastewater Treatment Works**

There is another existing WwTW; West Hythe, approximately 7 km from the boundary of the Otterpool Park development. West Hythe WwTW will need to be upgraded and this cost can be met by Southern Water subject to further benefit-cost assessment. However, these upgrades are complex and costly compared to the upgrade works that will be required at Sellindge WwTW.

4.4 **Preliminary Wastewater Treatment Options Assessment**

Extensive discussions with SW engineers and planners based on their knowledge of current capacity and performance at these existing WWTWs have been undertaken to assess the potential impact from the proposed development. The outcome of these consultations with SW and other NAV providers, that is informed by feasibility studies, are discussed below.

4.4.1 **Option 1 – Southern Water Sellindge Wastewater Treatment Works**

An initial connection to the WwTW can be made via Grove Bridge Pump Station if required but this has capacity for only 163 new units. Southern Water have confirmed that there is treatment capacity at Sellindge WwTW for approximately 1,000 new units. However, there is insufficient capacity within the existing pipe network between Grove Bridge Pump Station and Sellindge WwTW beyond 163 new homes even if the pump station was upgraded. Therefore, under this WwTW option, the proposed Point of Connection will be directly to Sellindge WwTW via a new rising main from the northwest boundary of the development to the WwTW crossing underneath HS1 Railway. The new rising main is likely to consist of a 200mm diameter temporary rising main for the first phase of the proposed Development, which will cater for up to 2,100 new homes (to ensure self-cleansing velocity of 0.75 m/s etc) and then increasing to 450mm diameter permanent rising main to accommodate the entire 10,000 homes Otterpool Framework Masterplan Area.

The proposed Development will require diversions of the existing FW drainage network across the site especially in south eastern and central parts of the site. As highlighted above in Section 4.1, the existing flows from Lympne and Stamford currently drain to the existing Racecourse Pump Station and Grove Bridge Pump Station. Therefore, Option 1 will provide the opportunity to introduce improvements to the existing network and by incorporating this existing network into the proposed Otterpool Park network. This makes the new pipework immediately adoptable by SW as it will be carrying flows from the existing customers. This solution may also attract cost sharing opportunities with SW due to the mutual benefits to all parties.

SW have provided preliminary proposals and feedback comments for the phased approach to this option. It is noted that a total delivery period of approximately 4 years is estimated to provide the new rising mains to Sellindge WwTW plus the Phase 1 upgrade to the treatment plant, which will accommodate 8,500 dwellings. Phase 2 upgrade to the WwTW will accommodate the full 10,000 dwellings.

Following the completion of the Otterpool Park growth feasibility study in 2019, SW started a Risk and Value Exercise in 2020 to confirm and develop the preferred WwTW to accommodate Otterpool Park. However as

highlighted in Section 2.1.2.2, Sellindge WwTW is also one of the SW assets that is also being investigated under a separate WINEP detailed study, which is due to be completed in 2022. This is to address NE's concerns in relation to potential linkage of existing WwTW discharges with nutrient enrichment at Stodmarsh Lakes European Designated Sites, as further described in Section 4.8. Therefore, until the WINEP study and associated recommendations are fully implemented there is considerable risk that the proposed Development is unable to connect to Sellindge WwTW, delaying the current programme.

4.4.2 **Option 2 – On-site Wastewater Treatment Works**

It is proposed that an on-site WwTW will be located in the northwest corner of the site with treated discharge into the adjacent watercourse (River East Stour). Albion Water and STC have been approached as a potential NAV provider to provide preliminary proposals for this option. As highlighted in Section 4.10, STC has now been formally appointed by Otterpool Park LLP to progress the Otterpool WwTW feasibility studies, enhanced outline design and EA discharge permit application.

As per Option 1 above, NE's concerns on the Stodmarsh Lakes nutrient enrichment, including the need to achieve nutrient neutrality is applicable to Option 2 because onsite WwTW will be located within the same EA's River Upper Stour operational catchment. Sections 4.8 to 4.10 provide further details on nutrient neutrality assessment and mitigation requirements, confirming the preferred option for Otterpool Park.

4.4.3 **Option 3 – Southern Water West Hythe Wastewater Treatment Works**

West Hythe WwTW will need to be upgraded, but these are inherently complex and costly compared to the upgrade works that will be required at Sellindge WwTW.

As part of SW's preliminary appraisal for the required treatment upgrade, the additional full development flow was considered by increasing the existing FFT by 120 l/s, utilising the existing works with additional treatment processes. The upgrade requirements would be for new inlet screening and grit removal; additional Activated Sludge Processing lane with upgrades to the Return Activated Sludge pumps and intermediate pumps; 2 No. new Final Settlement Tanks; 1 No. new sludge holding tank; upgrade of effluent return pumps and upgrade of power facilities. This notional solution however excluded an assessment of the outfall condition and its ability to accept the additional flows, which remains as a significant risk to this option.

The main difficulties associated with accommodating proposed Development at West Hythe WwTW include:

- Treatment works is served by a single pumping station (Range Road), which accommodates the preliminary treatment for the catchment prior to flow transfer to the treatment works, and limited expansion capacity is available at the pumping station site;
- A 7km long rising main is required for the transfer of flow to Range Road pumping station, including the significant potential for undertaking an Environmental Impact Assessment (EIA) for the pipeline;
- Limited land availability within the existing WwTW site boundary;
- Significant uprating of pumping capability and rising main to the WwTW is required if Otterpool Park flows are transferred to Range Road;
- Flows from treatment works are pumped back to Range Road prior to pumping down long sea outfall, the increase in flow will require new transfer pumps and rising main between West Hythe WwTW and Range Road Pumping Station;
- As there is no storage at West Hythe WwTW the incoming flow and outgoing flows are finely balanced, introducing additional flows directly to West Hythe also make the management of flows more complex; and
- Increased flows may require new/additional long sea outfall and a tightened discharge permit.

These complexities are in addition to the issues associated with transferring flows from Otterpool Park over a distance of 7 km to a different water catchment/coast from the current East Sour catchment that Otterpool Park

is located. This is not desirable due the scarcity of water in south-east England and exacerbate low flow issues in the River Stour.

Therefore, the West Hythe WwTW option has been discounted from further appraisal and only Sellindge WwTW will be taken forward along with onsite WwTW option discussed in Section 4.5 below.

4.5 Shortlisted Wastewater Disposal Options Assessment

4.5.1 Shortlisted WwTW Options Comparison

As highlighted in Section 4.4, only Options 1 and 2 have been taken forward for further review due to the complexities and costs associated with Option 3. Table 14 below compares the two shortlisted WwTW options.

Table 14: High level appraisal of shortlisted WwTW options

WwTW	Pros	Cons	
Option 1 – Southern Water Sellindge WwTW	Make use of an existing WwTW facility with all upgrades paid for by Southern Water so less up-front costs for the developer	Less control over the timeframe for delivery	
	Potential for early adoption of the network and reduced costs/land take for existing sewer diversions if existing flows are incorporated in the Otterpool Park new network	Possible issues with crossing HS1	
	Retains option of disposal of wastewater for Otterpool Park future development phases	 Need to achieve precautionary nutrient neutrality requirement (nitrates and phosphates) to protect Stodmarsh The required nutrient neutrality measures are likely to be more extensive, costly and complex to deliver when compared with Option 2 Significant risk to Otterpool Phase 1 programme due to the ongoing WINEP study 	
	Benefit to outlying communities	Offsite rising mains and pumping costs	
	Favours the EA's discharge permitting regime	Possible lack of space on Sellindge WwTW to accommodate the additional process units required to meet the NE's nutrient neutrality requirement and OWFAT also may not allow funding for the level of growth and treatment required that could limit the amount of development that SW are prepared to do in the longer term, limiting the actual development growth.	

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WwTW	Pros	Cons
	Greater control over deliverability	Land required for the treatment facility and significant up-front costs impacting overall development viability
	Greater engagement with the local community, potential for ecosystem service and natural capital benefits as a result of land ownership/ stewardship/ management	No benefits for existing communities
	Reduced foul water pumping	Need to achieve nutrient neutrality (nitrates and phosphates) as per Option 1
	Avoiding construction of offsite sewers and crossing under HS1	Higher capital costs
	Potential for local employment	Lead in time for delivery and commissioning
Option 2 – Onsite WwTW	Potential to use residual nutrients in local irrigation schemes (bio- resources and certain foods)	Less favours the EA's discharge permitting regime
	Prices no higher than regional incumbent	Additional sludge tanker movements on the road to and from the new WwTW
	Ability to provide a more advance and greener treatment technology plus onsite wetlands/ woodland planting to help achieving NE's nutrient neutrality requirement to protect Stodmarsh Lakes	
	Ability to provide an integrated water management solution for Otterpool and wider community, including possible water reuse	

4.5.2 Sellindge WwTW Option

Sellindge WwTW discharges to the River East Stour and the catchment is primarily underlain by impermeable Weald Clay. Rainfall flows quickly into the watercourse producing high flows in the wetter, winter months and very little flow during dry summers. Average annual flood, at 650 mm/year, makes it one of the driest areas in the country. For extra discharges to the River East Stour, the relatively large DWF volume compared with the river's natural flow will result in tight discharge permit limits (see Section 4.6).

Arcadis latest wastewater DWF calculations associated with Sellindge WwTW Option are outlined in Table 15. This shows that the Lower Bound and Upper Bound DWF impacts for the Otterpool Park Tier 1 OPA and Framework Masterplan, including 350 new homes at Sellindge Phase 2 Sites.

Table 15 indicates that Otterpool Park and Sellindge Phase 2 Sites will result in the existing EA discharge permit being significantly exceeded at Sellindge WwTW for all scenarios. SW has confirmed Sellindge WwTW could be upgraded (within the currently owned land limit) to fully cater for the Otterpool development, while

meeting the suggested indicative discharge permit provided by the EA (Section 4.6). As mentioned above, SW has also confirmed there is currently capacity for approximately 1000 new homes at the WwTW.

New Development Coverage	Existing DWF Consent (m³/day)	Measured Baseline DWF (m ³ /day)	Total Increase in Dwellings (2024-2044)	DWF Increase – Lower Bound (m ³ /day) (PCC:110 I/p/d)	DWF Increase - Upper Bound (m ³ /day) (PCC:130 I/p/d)	Total DWF - Lower Bound (m³/day) (PCC:110 I/p/d)	Total DWF – Upper Bound (m ³ /day) (PCC:130 I/p/d)
Otterpool Park Tier 1 OPA + Sellindge Phase 2	1,594	773	8,850	2,843	3310.3	3,616	4,083.3
Otterpool Park FMP + Sellindge Phase 2	1,594	773	10,350	3,278.6	3,825.1	4051.6	4,598.1

Table 15: Dry Weather Flow Impacts at Sellindge WwTW (including 350 homes at Sellindge Phase 2 Sites)

As explained before, a 200mm diameter temporary rising main and a new 450mm diameter rising main will be required as the available Point of Connection is directly to Sellindge WwTW, including a new crossing under the HS1 railway. The concurrent laying of both pipes is preferential from cost-viability purpose, but the temporary rising main will be required to connect the first property.

SW has started the Stage 1 Risk and Value exercise in 2020, to develop its preferred WwTW solution to serve Otterpool Park, by building on the recommendations of the 2019 feasibility study. However, making significant progress on the detailed design of the preferred rising mains route and Phase 1 treatment capacity upgrade has been partly hampered by the ongoing WINEP study risk, which is planned to be concluded in 2022.

If the WINEP study concludes that the discharge of nitrates and phosphates from Sellindge and other WwTWs negatively impacts Stodmarsh, then significant quality upgrades and offsite mitigation may be required across the impacted catchment. Given the five yearly cycle AMP funding periods, it could be unlikely that any such major improvements would be sufficiently completed before 2030 (i.e., as the worst case) although theoretically construction works can start anytime from 1st April 2025, assuming that further technical studies will be undertaken by SW in the current AMP7 period (2020-25). This is a major risk and will have a significant impact on the Otterpool Park delivery programme, leading to the consideration of alternative solutions discussed below.

Section 4.9 discusses likely indirect measures required to meet nutrient neutrality if proposed Development is to be connected to Sellindge WwTW ahead of WINEP study completion.

4.5.3 On-Site Disposal Providing New Onsite WwTW

Using the same approach as per Sellindge WwTW, the latest wastewater DWF calculations associated with onsite WwTW Option are outlined in Table 16 below. As a worst-case scenario for DWF loading, it was assumed that Sellindge Phase 2 Sites will also be connected to Otterpool onsite WwTW, as per the consultations held with F&HDC and NE.

Table 16: Dry Weather Flow Impacts at Onsite WwTW	(including 350 homes at Sellindge Phase 2 Sites)

New Development Coverage	Total Increase in Dwellings (2024-2044)	Total DWF – Lower Bound (m ³ /day) (PCC:110 l/p/d)	Total DWF – Upper Bound (m ³ /day) (PCC:130 l/p/d)
Otterpool Park Tier 1 OPA + Sellindge Phase 2	8,850	2,843	3310.3
Otterpool Park FMP + Sellindge Phase 2	10,350	3,278.6	3,825.1

4.6 Wastewater Treatment Discharge Permitting Needs

The major impact of the development on the water environment will be the variations in water quality and quantity discharged to receiving watercourses from the WwTW that serve Otterpool Park. Where discharges from WwTW will exceed the existing DWF consent, it is likely that the chemical constraints included within these consents will be tightened by the EA, to ensure that the water quality of the receiving watercourses does not deteriorate due to the increased discharges.

When assessing possible consent changes to the existing permits or issuing permits for new WwTWs the EA will take account of any sensitive sites and species downstream of the discharge, as well as the current dilution available from the river flow, and the possible benefits of increased flows.

The majority of receiving watercourses already exhibit high levels of phosphate, which cause them to be classed as not achieving good ecological status (or GES) under the WFD. This is a key concern throughout the majority of the East of England and will require ongoing cooperation between water companies, the EA and other parties such as Defra to overcome this issue. The development may not be permitted if it will lead to a deterioration in water status or will prevent Good Status from being achieved in line with DEFRA/EA recommendations.

WwTWs treat the sewage by a variety of methods to a standard that allows the water to be discharged to a watercourse without harm to the environment. The EA provides the regulatory framework in terms of rate of discharge and acceptable water quality that sewerage undertakers must achieve to allow the effluent to be discharged.

For WwTWs which receive effluent from combined sewerage systems, the EA regulate flow volume discharged by limiting the DWF of the discharge to a maximum value. This is important because the impact of a discharge on the receiving water is directly linked to the volume discharged. The effluent quality limits are determined on the basis of the consented DWF. In general, as the DWF increases, the quality limits become tighter.

Discharge volumes from the WwTW are calculated by the operator and a new permit issued by the EA which states a maximum DWF and corresponding limits for various parameters, principally BOD, ammonia, phosphate and suspended solids. Also, depending on the process chosen, the EA can impose other parameters (e.g. Iron or Aluminium if added to remove phosphate). It should be noted that the permit limits required for the new discharge may be beyond the limit of conventional treatment technology and thus could constrain development within a WwTW catchment.

4.6.1 Indicative Discharge Permit Modelling

The estimated DWF values were provided to the EA and mass balance Monte Carlo simulations had been undertaken by the EA in 2018 to understand the future indicative consent standards that would need to be applied to a new discharge or increased existing flow consents, and the change in downstream concentrations of physio chemical elements following a discharge. The EA 2018 modelling used the following projected DWF scenarios shown in Table 17.



New Development Coverage	Lower Bound DWF (m³/day)	Upper Bound DWF (m ³ /day)
Sellindge WwTW	3,877	4,508
Onsite WwTW	2,841	3,472

Table 15 and Table 16 show that the latest DWF estimates for each WwTW option are still within the EA's previously modelled DWF range in Table 17 if only Otterpool Park Tier 1 OPA and Sellindge Phase 2 Sites are to be connected.

However, the previously modelled DWF Upper Bound value will be exceeded at both WwTW options when the extra 1,500 dwellings within the remaining Framework Masterplan are also connected (i.e. by 90.1 m³/day at Sellindge WwTW and 353.1 m³/day at onsite WwTW respectively). Therefore, the indicative quality discharge permit values should be verified with the EA and updated accordingly through the normal permitting process.

For the purposes of comparing the implications of future consent requirements, the following physio-chemical standards have been assumed to represent current and future best practice. However, these should not be considered definitive, and will be subject to individual site conditions, existing processes employed, and strategic investment decisions undertaken by SW or the appointed NAV based on current and future Ofwat/ EA priorities.

The Red Amber Green (RAG) colour convention in Table 18 is used throughout the following sections to identify where the modelled water quality values fit into the above categories. The figures quoted are in milligrams per litre (mg/l) and the determinants are Biochemical Oxygen Demand (BOD), Ammonia (Amm.N) and Soluble Reactive Phosphorus (SRP).

Table 18: Current and future effluent quality standards assumed to be economically achievable using conventional treatment technology

Notes	BOD mg/l (95%ile)	Amm. N mg/l (95%ile)	SRP mg/l (Annual Average)
Limits typically considered as reliably economically achievable using conventional technologies.	8	3	1
Limits that may be currently achieved by enhanced operation of conventional and emerging processes. Although not as reliable as the above, it is assumed that consents such as these will become more common over the study period if water quality constraints are to be met.	5	0.5	0.25
Limits more stringent than the above, where it is assumed unlikely a water company or process supplier would be able to guarantee such performance in the foreseeable future at a large scale without resorting to energy- intensive processes normally reserved for potable water treatment. *	<5	<0.5	<0.25

* If such standards were required in the short term, it is likely the water company and the EA would have to agree to set lower targets for the waterbody under the provision of the WFD, allowing the failure to meet good status for reasons of technical feasibility or disproportionate cost. This would be reviewed every six years under the WFD.

The EA normally takes the applied-for DWF, described above, limit at face value, although details of the calculation form part of the consent application. However, it is in the operator's own interests to apply for the correct limit, as a too-low limit may lead to consent non-compliance and a too-high limit can result in tighter quality standards than would otherwise be the case.

The River East Stour River is classified as Moderate under the WFD. One of the reasons that the water body is not achieving Good status is high phosphate levels. Phosphate levels are believed to be elevated due to a number of factors including agriculture, urban run-off and treated wastewater. The water body is also not achieving Good status due to Macrophytes and Phytobenthos.

River flows in the upper catchment of the River East Stour can be very low, making it generally unsuitable as a receiving watercourse for treated effluent. Any treated effluent would need to be to a very tight standard to ensure no deterioration of the water body.

Table 19 below details the potential water quality implications of the EA discharge permits if the new development is connected to existing Sellindge WwTW or served by a new onsite WwTW, based on the previous EA preliminary modelling in 2018. The EA has recently confirmed that these discharge permit values are still applicable unless the previous DWF estimates are changed.

WwTW	BOD mg/l		Ammonia mg/l		Phosphorus mg/l	
	Lower Bound DWF	Upper Bound DWF	Lower Bound DWF	Upper Bound DWF	Lower Bound DWF	Upper Bound DWF
Sellindge WwTW	8/45	8/45	2/12	2/12	0.3	0.3
Onsite WwTW – Upstream Outfall Location @ NGR 609426 137712 (at Harringe Lane Bridge)	5/20	*	0.5/12	*	0.1	*
Onsite WwTW – Downstream Outfall Location @ NGR 608558 138047 (at confluence with East Stour and Horton Priory Dyke)	8/45	7/44	2/12	2/12	0.3	0.3

Table 19: Indicative Discharge Permit Modelling Results Summary (based on EA's 2018 preliminary modelling)

* Not calculated due to very stringent limits calculated for DWF

For discharges to the River East Stour, the relatively large DWF volume compared with the river's natural flow will result in tighter permit limits than the existing limits, both to achieve no deterioration in current WFD status and also plans to achieve good status in the East Stour. To meet river nutrient standards, phosphorus removal from the discharge will be required. In summary, both WwTW options discharging to the River East Stour will need to meet very stringent discharge conditions, including phosphate reduction measures.

For Sellindge WwTW overall, the increased DWF results in more stringent requirements for all determinants, however, this is still largely within the limits of conventional and emerging treatment technology. SW has confirmed Sellindge WwTW could be upgraded (within the current land limit) to fully cater for the Otterpool development, while meeting the suggested indicative discharge permits provided by the EA. It should be noted that even under the Upper Bound scenario, the indicative permit values are still within the limits of conventional and emerging technology for this conservative DWF estimate.

STC, has confirmed that it can achieve the discharge permit values for the onsite WwTW with both final outfall locations. Whereas, AWL can only commit to the downstream final location due to the perceived risks associated with meeting very strict indicative permit limit for Phosphorus of 0.1 mg/l associated with the upstream outfall location. Due to the larger existing baseflow available in the River East Stour to dilute the effluent discharge, the downstream outfall location has a less stringent permit limit for Phosphorus of 0.3 mg/l.

All flows in excess of 2,841 m³/day (i.e., the maximum DFW that can be discharged at the upstream outfall location) will require discharging to the downstream outfall location using an offsite outfall sewer. Based on the latest DWF estimates presented before, this excess DFW can be between 437.6 m³/day (Lower Bound) and 984.1 m³/day (Upper Bound) in order to fully accommodate the entire Otterpool Framework Masterplan Area and Sellindge Phase 2 Sites. The indicative permit limits that the EA have previously provided did not account for simultaneously having discharges at more than one outfall location, i.e. both "at Harringe Lane Bridge" and at "confluence with East Stour and Horton Priory Dyke". For the indicative permit limits, the calculations were based on having only one of those discharges.

Therefore, STC should make a new request to the EA for providing indicative permit limits through the normal permitting channels, prior to reaching the currently agreed DWF limit of 2,841 m³/day at the upstream outfall at Harringe Lane Bridge. This staged approach also gives STC the opportunity to monitor actual DWFs (from

flow meters) and PCC rates (from the customer meter readings), while taking into account any positive impacts on the baseline water quality (from sampling) and base flows (from flow gauging) due to the proposed SuDS, wetlands, woodlands etc. in the impacted East Stour reach between the wastewater outfalls locations.

The additional discharge permit must be then obtained from the EA to ensure that this extra DWF can be discharged at the downstream outfall location at the confluence with River East Stour and Horton Priory Dyke (NGR 608558 138047). However, STC is able to meet the same quality parameters that is applicable to the upstream discharge point (i.e. BOD = 5 mg/l, Ammonia = 0.5 mg/l and Phosphorous = 0.1 mg/l) using the proposed NUTREM® treatment technology, which is considerably tighter than the indicative permit values previously provided by the EA for the second downstream outfall location, as a single discharge point.

It should also be noted that NAV as a statutory undertaker, could lay a discharge pipe to the offsite outfall location under its statutory powers under the Water Resources Act, prior to the trigger point for this offsite discharge outfall has been reached.

This analysis confirms that the WFD requirements can be sufficiently met to accommodate the proposed Development (including Sellindge Phase 2 Sites) with both Sellindge and Onsite WwTW options. However, it is also recommended that as the development phases are progressed DWF is closely monitored, and a revised EA discharge permit is applied to account for the final development phases in OFMA. This will allow for a better understanding of:

- The actual water consumption rates in Otterpool Park and the treated flow amounts at the receiving WwTW, fully reflecting the effectiveness of the implemented water efficiency and reuse options proposed in Section 3.2 and 5.3; and
- Expected general water quality improvements in the River East Stour due to increased baseflows and the proposed onsite SuDS and nutrient mitigation wetlands.

4.7 Flood Risk from WwTW Discharges

Increased discharge volumes from WwTWs to watercourses have the potential to increase fluvial flood risk and a multi-criterion scoring system has been applied to assess the risk. The assessment uses a multi-criteria approach to assess the increase in peak flow, the sensitivity of the watercourse to changes in flood levels, and the potential impact of flooding in order to determine a combined flood risk index. The following three elements of the system are principal:

Quantification of the increase in peak river flows, resulting from the predicted increase in treated effluent discharges;

Evaluation of the likely sensitivity of flood levels to increases in flood flows; and

Evaluation of the impact of increases in flood levels.

For each principal element listed above, the impact at each discharge site has been classified as high, medium or low; and the multi-criteria analysis applied to combine these elements.

4.7.1 Methodology

The analysis has been conducted using the 1 in 2 annual chance flood event, also known as the 50% AEP (Annual Exceedance Probability) event. This has a probability of occurrence in any one year of 50%. It is also referred to as QMED. According to the following methodology, this flood severity was selected because:

- Increases in WwTW discharge would contribute a relatively greater proportion of flood flows than if a more extreme flood event had been used, and hence results are likely to be conservative;
- The 1 in 2 annual chance flood event is, very crudely, considered to approximate bank full conditions. Any increase in the 1 in 2 annual chance would, therefore, be expected to result in out of bank flooding; and
- The 1 in 2 annual chance flood event is the smallest event which can practically be estimated using standard techniques.

The increase in the 1 in 2 annual chance flood event peak flow in the receiving watercourse has been calculated in line with best practise techniques as stated in the Flood Estimation Handbook (FEH). The increase in discharge from the WwTW used in these calculations are discussed below.

DWF received at the WwTWs will increase following the connection of new dwellings to the sewerage network. While some of this increase may be stored on the WwTW site during peak flows, an increase to the volumetric flow rate of the discharge is likely. However as mentioned in Section 4.2, WwTWs typically (in particular within combined sewer catchments) discharge up to three times their DWF (referred to as FFT) at peak. An increase in FFT, due to growth in the catchment, may increase the flood risk to properties and environmental sites on the watercourse downstream of the discharge point.

Multi-criteria analysis (as described above) has been utilised to provide a risk score for each of the three impacted WwTW effluent discharge points. Flood Risk scores were assigned to each discharge by determining the contribution that the increased FFT (due to the proposed growth from 10,000 homes to 2044) makes to the flow levels in the watercourse during a 1 in 2 annual chance flood event. This was then weighted to account for the sensitivity of the watercourse to flow increases, and the local impacts of any flooding.

4.7.2 Results

It must be highlighted that the above methodology compares the total 2044 FFT from the WwTWs (flows from both existing dwellings and proposed entire Otterpool Park Framework Masterplan and 350 dwellings at Sellindge Phase 2 Sites) against the 1 in 2 annual flood events for the watercourses, hence providing a risk score for the total predicted flows by 2044.

The estimated FFT values are presented in Table 20 below, which confirms that the total increase in FFT from the cumulative development is:

- Lower Bound 9,239.7 m³/day or 106.9 l/s
- Upper Bound 10,779.7 m³/day or 124.8 l/s

Table 20: FFT values due to the planned development

	Estimated FFT (m³/day)			
Development Details	Lower Bound – with domestic PCC rate of 110 l/p/d	Upper Bound – with domestic PCC rate of 130 l/p/d		
Otterpool Park Framework Masterplan	8,953.2	10,441.2		
Sellindge Phase 2 Sites	286.4	338.5		
Total FFT (m³/day)	9,239.6	10,779.7		

If FTFT from the existing properties is considered to be an integral part of the current river flows, it can be shown that the actual increase in peak flood flows by rivers by 2044, which is solely attributable to proposed growth, makes up a considerably smaller proportion.

In accordance with EA's latest guidelines on climate²⁷, an additional 45% was added to the 1 in 2 annual chance flood event flows. The new FTFT values have been projected to 2044 at each WwTW location; therefore, considering river flow values, including a +45% allowance for climate change.

Due to the relatively low base flows in the River East Stour, the proposed increases in WwTW discharges do noticeably change the flow risk score when compared against the current situation as shown in Table 21 overleaf. The risk value for all three WwTW options has been assessed as having a "Low" or "Medium" impact.

²⁷ https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

There are limited receptors (i.e. villages and towns) located in the immediate downstream reaches, resulting in a low impact. However, Aldington Flood Storage Reservoir (FSR) is located slightly downstream of the Otterpool Park towards Ashford, this more sensitive receptor has been fully considered during the development of the surface water and flood risk management strategy to ensure no increase in downstream flooding.

For example, the proposed surface water discharge rates for 1 in 100 annual chance flood (1% AEP) are lower than the existing greenfield rates (see Section 5.0) in several drainage zones and significant additional long-term attenuation storage has been provided in the proposed SuDS and other large wetland features. This means no overall increase in peak flow rates on the River East Stour when compared to the potential maximum extra DWF discharge of 3,825.1 m³/day (44 l/s), resulting from the Otterpool Framework Masterplan Area and Sellindge Phase 2 Sites. This represents a very minor proportion of the flood flows in the River East Stour (i.e., 2% of QMED and 0.3% of 1 in 100 annual chance flood for the 11 hr catchment duration) and therefore considered to have a negligible impact on the downstream flood risk. Even with maximum FFT flow of 9,239.6m³/day (107 l/s) from the Otterpool Framework Masterplan Area and Sellindge Phase 2 Sites, this represents only 0.8% of in 100 annual chance flood for the 11hr catchment duration. The proposed reedbeds wetlands for delivering nutrient neutrality will also inherently act as stormwater attenuation.

Section 5.0 provides discussion on the predicted overall reductions in modelled flows and volumes (based on Infoworks ICM modelling undertaken), which can be further improved as part of the recommended integrated water management strategy, with rainwater reuse etc. Therefore, it is proposed that some rainwater harvesting will be implemented in targeted areas, which will further reduce downstream flood risk impacts on the Aldington FSR. This means there is a net flood risk reduction benefit in downstream Ashford due to the Otterpool Park.

Table 21. Summary	Impact of	Impact of FTFT (Lower Bound) from Development (2024- 2044) on river flows			Impact of FTFT (Upper Bound) from Development (2024- 2044) on river flows		
WwTW Discharge	Increase in 1 in 2 annual chance river flow	Flood Flow Risk Value	Risk Assessment	Increase in 1 in 2 annual chance river flow	Flood Flow Risk Value	Risk Assessment	
Sellindge WwTW	1.71	3	Medium	1.71	3	Medium	
Onsite WwTW – Upstream Outfall Location @ NGR 609426 137712 (at Harrindge Lane Bridge)	1.92	3	Medium	1.92	4	Medium	
Onsite WwTW – Downstream Outfall Location @ NGR 608558 138047 (at confluence with East Stour and Horton Priory Dyke)	3.65	2	Low	3.65	3	Medium	

Table 21: Summary of flood risk multi-criteria analysis results.

Flood Flow Risk Value:

Flow increase between 0 and 1%:

1 (Low)

Otterpool Park Environmental Statement Appendix 15.2 - Water Cycle Study

- Flow increase between 1 and 3%: 2 (Low)
- Flow increase between 3 and 10%:
- Flow increase between 10 and 20%:
- Flow increase greater than 20%: 5 (High)

The River East Stour catchment can have very low summer flows and the EA has identified the increased flows from WwTWs can have beneficial impacts in relation to the hydrology of watercourse (provided that stringent discharge parameters are met). In addition, as the Otterpool SuDS strategy reduces peak flows for the extreme events (e.g. 1 in 30, 1 in 100 annual chance) to the River East Stour, by limiting discharge rates to the equivalent greenfield runoff rates or lower (2 l/s/ha) as stated above, so that any increased flow from the WwTW discharge will be classified as negligible in comparison. Therefore, the increased flow from each WwTW site is classified overall as having a low – medium flood risk, which not compromising the current Standard of Protection in the downstream river reaches.

3 (Medium)

4 (Medium)

However, it has for some time been acknowledged that climate change will impact flood risk in the future. This is a risk defined as "the frequency and intensity of future rainfall events may increase due to climate change, leading to higher run-off rates into surrounding rivers, altering the hydraulic response of the river to the rainfall event". It is now academically accepted that climate change has had such an effect on UK flooding. It follows therefore that the flow rates associated with the 1 in 2 annual chance flood events (as described in the analysis above) have been predicted to occur more frequently in the future. While the significance of the WwTW discharges, and downstream impacts and sensitivity are likely to remain the same for any given river flow; the frequency of flooding is likely therefore to increase. F&HDC should, therefore, continue to ensure that flood resilience and mitigation remain key in the decision-making process of their Planning and Development Control Functions in line with the latest government and local guidance and policy on flood risk management, including implementation of the recommendations of this WCS and associated FRA&SWDS prepared by Arcadis.

4.8 Nutrient Budget Analysis

4.8.1 Background

Excessive nutrient levels (nitrogen and phosphorous) can negatively impact on the Stodmarsh Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. The site is also designated as a Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR). Information has recently emerged related to existing water quality impacts (eutrophication) on the designated sites, caused by high nutrient levels including nitrogen and in particular phosphorus. NE believes that the latter originates mainly from the permitted wastewater discharges into the River Stour and a detailed Water Industry National Environment Programme (WINEP) investigation is currently underway by Southern Water, which will report its findings in 2022. Existing Sellindge WwTW that Otterpool Park could potentially use is also included in this WINEP investigation.

NE advised FHDC in May 2020 that the water quality issues should be assessed through an updated Habitats Regulation Assessment (HRA) as part of the CSR, which is currently been submitted for Examination. This should include all proposed site allocations (including the Otterpool Park), which may be served by the existing or new WwTW within the River Stour Catchment that can impact Stodmarsh. This should include calculation of the nutrient budget for all affected CSR site allocations with respect to nitrogen and phosphorous, with all mitigation options outlined, along with the fundamental precautionary principle that each scheme must achieve nutrient neutrality in order to provide certainty of avoiding adverse effect on integrity of the designated sites.

A roundtable meeting was organised by F&HDC in June 2020 to discuss the methodology and scope for their Appropriate Assessment Update and Nutrient Neutrality Assessment for the CSR and the Tier 1 Otterpool Park OPA. At this meeting, NE also advised that if Otterpool Park can demonstrate (i.e. as a standalone site) that it can achieve Nutrient Neutrality (as set out in their published guidance in relation to Stodmarsh), then it would fully satisfy their current concerns on any adverse impacts to Stodmarsh from the proposed Development.

As stated in NE advice to planning authorities, proposed developments that would result in a net increase in population served by a wastewater system should be nutrient neutral to remove uncertainty as to whether they might contribute to the unfavourable water quality at Stodmarsh, and thus facilitate their compliance with the Conservation of Habitats and Species Regulations (CHSR) (2017). In practice, this means that the key nutrients (nitrogen and/or phosphorus) from all surface water runoff and wastewater generated by the proposed development must be less than or equal to the nutrients generated by the existing land uses and wastewater discharges. Any development being approved for development through the planning process that is not nutrient neutral could be deemed to contravene the CHSR and the approving planning authority be at risk of judicial review because of an objection by NE.

Further consultation took place with F&HDC and NE to scope the methodology and the extent of study area for the Otterpool Park Nutrient Neutrality assessment. The following proposed site allocations from F&HDC's Regulation 19 Submission Version of the CSR that are planned to discharge to the River Stour Upper Catchment have been then included in the nutrient budget calculations presented in this WCS:

- The proposed Development and the remainder of Ottterpool Park Framework Masterplan Area; and
- Two proposed broad site allocations in Sellindge (CSD9A and CSD9B).

Otterpool Park nutrient budget assessment follows:

- NE's published final guidance on Nutrient Neutrality for new development in the Stour Valley Catchment in relation to the Stodmarsh Designated Sites for Local Planning Authorities¹⁶ (November 2020);
- Consultation advice provided to Arcadis within NE's letter dated 06th October 2020, as part of NE's Discretionary Advice Service;
- Consultation advice provided to FHDC for their CSR Site Allocations within NE's letter dated 15th October 2020, as part of NE's Discretionary Advice Service;
- Consultation advice provided to Arcadis within NE's letter dated 02nd December 2020, as part of NE's Discretionary Advice Service;
- Statement of Common Ground between NE and F&HDC dated 03rd December 2020 (see Appendix C); and
- Consultation advice provided to Arcadis within NE's letter dated 01st June 2021, as part of NE's Discretionary Advice Service.

4.8.2 Development Details and Assessment Parameters

As stated in Section 1.5, the Otterpool Park Framework Masterplan for the proposed garden settlement includes up to 10,000 new residential homes and associated non-residential uses/infrastructure, 71 ha of existing community and 54.9 ha of retained farmland, covering a total area of 756.1 ha. Otterpool Park Garden Settlement is jointly promoted by F&HDC and Otterpool Park LLP. Section 1.5 also provided further details of the proposed Development as part of this Tier 1 OPA.

In summary, the nutrient budget calculations for the Otterpool Park Framework Masterplan are based on:

- 8,704 Class C3 residential units;
- 1,296 Class C2 extra care residential units ; and
- 117 rooms Class C1 hotel.

Similarly, Sellindge CSD9A and CSD9B CSR site allocations include 188 new houses within a total site area of 9.06 ha and 162 new houses within a total site area of 18.91 ha respectively. These two sites are currently being promoted by Quinn Estates and other developers. The total of 350 homes at two Sellindge Sites were taken as Class C3 residential units.

The two PCC scenarios shown in are used in the nutrient budget assessment discussed in the remaining sections. Both PCC scenarios provide a robust assessment as the rates used for Class C1 and C2 are higher than the recommended minimum 110 l/p/d by NE.

Table 22 Assumed PCC Scenarios in Nutrient Budget Assessment

Residential Land use	PCC Scenario 1 – See Note 1 (I/p/d)	PCC Scenario 2 – See Note 2 (I/p/d)
Class C3	110	110
Class C2	350	262.5
Class C1	300	225

Notes

- 1 Scenario 1 PCC rate for Class C3 is based on 110 l/p/d as per NE published guidance and CSR Policy SS9. However, for Class C2 and Class C1 are as per the recommended higher PCC rates in British Water Flows and Loads – 4 Code of Practice (revised in 2013)
- 2 Scenario 2 PCC rate for Class C3 is based on 110 l/p/d as per NE published guidance and CSR Policy SS9. However, for Class C2 and Class C1 are as per the recommended PCC rates in British Water Flows and Loads – 4 Code of Practice (revised in 2013) are reduced by 25% to reflect the additional water efficiency measures proposed at Otterpool Park. This is because a similar % reduction can be seen for PCC in relation to the standard Class C3 dwellings when compared with the British Water recommended PCC rates.

4.8.3 Baseline Nutrient Loading

The existing land use within the area impacted by Otterpool Park Framework Masterplan boundary is predominately agricultural use or greenfield in nature although it includes 71 ha of existing community and 54.9 ha of retained farmland. Appendix D includes a figure showing the existing land type categories in the main development area. This information is also summarised in Table 23 below, along with their assumed nutrient loss rates. This information is derived based on the NE's published guidance stated above, along with the ecological habitat surveys that had been undertaken by Arcadis throughout the project duration since 2016 and recent consultations undertaken with F&HDC, NE, Arcadis project team and local land agents.

Table 23 Existing Land Types and Nutrient Loss Rates Within Otterpool Park Framework Masterplan

Existing Land Type	Area (ha)	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year
Cereals	324.9	27.3	0.36
Lowland Grazing Livestock	119.1	12.2	0.24
Racetrack – See Note 2	13.5	13.3	0.5
Hay Cut	18.9	5	0.14

Existing Land Type	Area (ha)	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year
Other Grassland or greenfield	101.1	5	0.14
Mixed – Urban	11.5	14.3	0.83
Mixed – Greenfield	4.5	5	0.14
Remaining Urban Area in Framework Masterplan	19.9	14.3	0.83



Notes

- 1 The remaining 142.7 ha in the Otterpool Park Framework Masterplan boundary is excluded from the nutrient neutrality assessment as the existing land use in this area is unchanged by the proposed development. This excluded area includes 71 ha of existing community, 54.9 ha of retained farmland and 16.8 ha of retained buildings, waterbodies, woodland, hedgerows and other ecological features.
- 2 Average TN and TP loss values of Urban Land and Lowland Grazing Livestock Farmland categories (i.e. assuming a 50:50 split) have been taken for the Racetrack as discussed with NE to reflect its former use.

Similarly, existing land use information for CSD9A and CSD9B is summarised in Table 24 below, along with their assumed nutrient loss rates as per NE's published guidance.

Table 24 Existing Land Types and Nutrient Loss Rates Within CSD9A and CSD9B

Existing Land Type	Area (ha)	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year
CSD9B/Cereals	17.16	27.3	0.36
CSD9B/ Urban	0.7	14.3	0.83
CSD9B/Other grassland or greenfield	1.05	5	0.14
CSD9A/ Urban	0.08	14.3	0.83
CSD9A/Other grassland or greenfield	8.98	5	0.14

Total Area 27.97

4.8.4 Post Development Nutrient Loading

4.8.4.1 Onsite WwTW Option

Nutrient budget estimates have been undertaken for the currently preferred Onsite WwTW solution in accordance with STC proposal as it provide a higher level of nutrient removal compared to the alternative AWL proposal. The assessment is completed using an average household occupancy rate of 2.4 for the two PCC scenarios in Table 20.

Depending on the chosen final discharge outfall location for the proposed Otterpool Park Onsite WwTW and corresponding DWF volume, the EA has confirmed the indicative discharge permit values shown in Table 19 (see Section 4.6). STC has confirmed that they are able to meet any of these EA discharge permit values while limiting Total Nitrogen (TN) discharge to 7.2 mg/l for the purpose of achieving NE's nutrient neutrality requirement. Therefore, as agreed with NE, a Total Nitrogen limit of 7.2 mg/l and a Total Phosphorus (TP) limit of 0.1 mg/l have been used.

The excel calculation files used for performing the nutrient budget assessment for onsite WwTW (see Appendix D), include the following information along with the key assumptions and parameters used in the calculations:

- Worksheet 1 Key Input Data;
- Worksheet 2 Nutrient Budget Calculations for Onsite STC WwTW option, with PCC Scenario 1;
- Worksheet 3 Nutrient Budget Calculations for Onsite STC WwTW option, PCC Scenario 2;
- Worksheet 4 Wetland Mitigation Requirement Summary for PCC Scenario 1 and Scenario 2;
- Worksheet 5 Existing Land Type Information Used in the Assessment;
- Worksheet 6 Existing Mixed Land Type Information Used in the Assessment;
- Worksheet 7 Proposed Land Use Type Information Used in the Assessment; and
- Worksheet 8 Proposed Wetland Details and Preliminary Hydraulic Loading Assessment.

The nutrient budget assessment follows the following principal four-staged approach described in NE's published nutrient neutrality guidance¹⁶:

- **Stage 1** Calculate the developments' total nutrients loading that would be discharged (via wastewater treatment works) into the Stour catchment;
- **Stage 2** Calculate existing (pre-development) nutrients loading from the current land use of the development site;
- **Stage 3** Calculate nutrients loading for the future land uses proposed for the development site; and
- **Stage 4** Calculate change in total nutrients loading as a result of the proposed development

Table 25 below summarises the estimated total net nutrient budget requirement for Onsite WwTW, which includes a 20% precautionary buffer under Stage 4, as per the Natural England's guidance.

	PCC Rate – Se	cenario 1	PCC Rate – Scenario 2		
Development Coverage	TN (Kg/year)	TP (Kg/year)	TN (Kg/year)	TP (Kg/year)	
Otterpool Park Framework Masterplan Only	3,526 <i>(2,845)*</i>	285 (234)*	2,703 <i>(2,023)*</i>	273 (223)*	
Otterpool Park Framework Masterplan plus Sellindge Sites CSD9A and CSD9B	3,526 <i>(2,845)*</i>	299 (248)*	2,704 <i>(2,023)*</i>	287 (237)*	

Table 25 Nutrient Budget Assessment Summary for Onsite WwTW Option

*The sensitivity check values for the reduced TN and TP values are shown in italics/brackets. This is after reducing the urban area by 61 ha due to the additional open space areas (including SuDS) provided in the illustrative masterplan (ES Appendix 4.5) outside the designated open space, but currently excluded in the Tier 1 OPA parameter plans (ES Appendix 4.2). Suitable Alternative Natural Green Space (SANG) area is also increased by the same 61 ha accordingly.

4.8.4.2 Sellindge WwTW Option

Nutrient budget estimates have also been undertaken for the alternative Sellindge WwTW solution (see Appendix E) in accordance with the same methodology discussed in Section 4.8.4.1. Therefore, TP discharge permit value of 0.3 mg/l is used for Sellindge WwTW, whereas a TN limit of 25 mg/l was assumed (as per NE published guidance and consultations held with Southern Water) in the absence of a defined discharge permit value for TN.

Table 26 below summarises the estimated nutrient budget requirement for Sellindge, which includes a 20% precautionary buffer under Stage 4, as per the Natural England's guidance.

Table 26 Nutrient Budget Assessment Summary for Sellindge WwTW Option

	PCC Rate – Se	cenario 1	PCC Rate – Scenario 2		
Development Coverage	TN (Kg/year)	TP (Kg/year)	TN (Kg/year)	TP (Kg/year)	
Otterpool Park Framework Masterplan Only	27,780 (27,100*)	557 (507)*	24,925 <i>(24,425)*</i>	523 (473)*	
Otterpool Park Framework Masterplan plus Sellindge Sites CSD9A and CSD9B	28,429 (27,749*)	578 (528)*	25,574 (24,893*)	544 (494)*	

*The sensitivity check values for the reduced TN and TP values are shown in italics/brackets. This is after reducing the urban area by 61 ha due to the additional open space areas (including SuDS) provided in the illustrative masterplan (ES Appendix 4.5) outside the designated open space, but currently excluded in the Tier 1 OPA parameter plans (ES Appendix 4.2). SANG area is also increased by the same 61 ha accordingly.

4.9 Nutrient Mitigation Options

For undertaking the preliminary hydraulic loading calculations and design for the proposed wetlands and associated nutrient mitigation measures the following key guidance documents have been used:

- EA's Guidance Manual for Constructed Wetlands²⁸, has been used for undertaking the initial hydraulic loading calculations and design preparation for the proposed wetlands;
- NE's published final guidance on Nutrient Neutrality for new development in the Stour Valley Catchment in relation to the Stodmarsh Designated Sites for Local Planning Authorities¹⁶;
- CIRA SuDS Manual C753²⁹.

As per the NE's guidance and consultations undertaken during this WCS, the following well-accepted median values have been assumed for the TN and TP removal rates for the constructed wetlands, at this Tier 1 Outline stage:

- TN removal rate 93 g/m²/yr for both wastewater and stormwater discharges;
- TP removal rate 1.2 g/m²/yr for both wastewater and stormwater discharges.

However, at the detailed design stage it must be demonstrated that these values will be achievable on site. Therefore, bespoke wetland specific calculations using estimations of hydraulic and nutrient loading are required at the Tier 3 reserved matters stage, which can demonstrate that the efficacy proposed can be achieved at Otterpool Park.

4.9.1 Onsite WwTW Option

Table 27 below shows that 20 - 25 ha of new wetlands may be required to offset the overall nutrient loading surplus shown in

²⁸ Guidance Manual for Constructed Wetlands, R&D Technical Report P2-159/TR2, Environment Agency 2003

²⁹ SuDS Manual C753, CIRA 2015

Table 25 for the onsite WwTW to serve both the Otterpool Park FMP and Sellindge Phase 2 Sites. Potential locations to provide approximately 29 ha of new wetlands have been identified within the proposed Development (see Table 28). Therefore, achieving nutrient neutrality with STC onsite WwTW option is technically feasible with both PCC Scenario rates.

Table 27 Wetland Area Requirements for Onsite WwTW

	PCC Rate – Sc	enario 1	PCC Rate – Scenario 2		
WwTW Option	Wetland for Area TN (ha)	Wetland for Area TP (ha)	Wetland for Area TN (ha)	Wetland for Area TP (ha)	
Otterpool Park Framework Masterplan Only	3.8 <i>(3.1)</i> *	23.7 (19.5)*	2.9 (2.2)*	22.8 (18.6)*	
Otterpool Park Framework Masterplan plus Sellindge Sites CSD9A and CSD9B	3.8 <i>(3.1)</i> *	24.9 (20.7)*	2.9 (2.2)*	23.9 (19.7) *	
	Up	1	Lower Bound		

*The sensitivity check values for the reduced TN and TP values are shown in italics/brackets. This is after reducing the urban area by 61 ha due to the additional open space areas (including SuDS) provided in the illustrative masterplan (ES Appendix 4.5) outside the designated open space, but currently excluded in the Tier 1 OPA parameter plans (ES Appendix 4.2). SANG area is also increased by the same 61 ha accordingly.

Figure 7 below and Table 28 below and Appendix F summarise the key information related to the proposed wetlands. In line with Natural England's guidance, stormwater wetland sizes will be optimised where possible to maximise their nutrient removal efficiency by interlinking smaller storm wetlands with SuDS features and existing smaller local watercourses, to collectively provide a larger wetland area while maintaining sufficient base flow.

Otterpool Park Environmental Statement Appendix 15.2 - Water Cycle Study

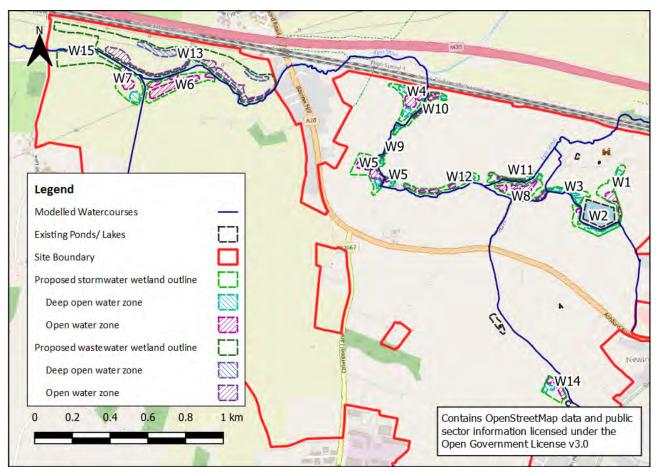


Figure 7: Overview plan of proposed wetlands

HRT's of 5-30 days and Hydraulic Loading Rates (HLRs) of <0.1m/day have been recommended (Wu et al,, 2015). Shallow water depths (<0.5m) are also recommended to increase the contact time between effluent and wetland sediment, whilst also keeping water oxygenated through good contact with the atmosphere (Wu et al,, 2015).

Preliminary hydraulic loading calculations (see Appendix D) have been initially undertaken in line with EA's Guidance Manual for Constructed Wetlands, R&D Technical Report P2-159/ TR2 to provide treatment storage for the 15 mm first flush runoff from the contributing stormwater catchments. The estimated treatment depth is shown in Table 28, which demonstrates that the preliminary proposals are technically feasible and able to provide sufficient level of treatment volume to accommodate the proposed development. The estimated preliminary Hydraulic Retention Time (HRT) for the Wastewater Treatment Wetlands (W13 and W15) indicates that this may vary between 1 day to 8 days, depending on the effective wetland treatment depth provided between 50mm and 250mm. Therefore, an effective treatment depth of 250mm is recommended for Wetlands W13 and W15 to provide a HRT of greater than 5 days to provide effective treatment for sediment and nutrient removal from the wastewater discharges from the Onsite WwTW. The hydraulic calculations in Appendix D also show that HLR is less than the recommended 0.1m/day maximum value. As highlighted in Table 28 and Section 4.10, wastewater wetland W15 is only needed to provide the tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in OFMA.

Table 28 Proposed Wetland Details Summary

Otterpool Park Environmental Statement Appendix 15.2 - Water Cycle Study

Wetland Location Ref.	Indicative Wetland Area (ha)	Treatment Depth (m)	Average Wetland Depth (m)	Comments
W1	1.46	0.35	0.65	Treats OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W2	0.92	0.38	0.68	Treats OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W3	0.94	0.04	0.34	Treats s OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W4	1.70	0.07	0.37	Treats OPA Site storm discharge, W4 and W5 are interlinked (Total area: 3.81ha).
W5	2.11	0.16	0.46	Treats OPA Site storm discharge. W4 and W5 are interlinked (Total area: 3.81ha).
W6	2.63	0.27	0.87	Treats OPA Site storm discharge.
W7	1.87	0.05	0.35	Treats OPA Site storm discharge but can also provide tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in OFMA W7 and W15 are interlinked (Total area: 3.71 ha).
W8	1.61	0.45	0.75	Treats OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W9	0.27	0.13	0.73	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W10	0.78	0.21	0.81	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W11	0.52	0.04	0.64	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W12	1.26	0.04	0.34	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W13	9.75	0.25	0.50	Provides tertiary treatment for the wastewater discharge from the OPA site. The total footprint of the wetland is 13.01ha but only 75% is taken as effective area (9.75ha) due to earth works required for cascade wetland features.
W14	1.11	0.08	0.38	Treats storm discharge.
W15	1.84	0.25	0.50	Not required for the Tier 1 OPA – but provides tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in

Wetland Location Ref.	Indicative Wetland Area (ha)	Treatment Depth (m)	Average Wetland Depth (m)	Comments
				OFMA. W7 and W15 are interlinked (Total area: 3.71 ha).
Total Area	28.77			

The proposed offline storm wetlands are distributed across the Otterpool Park Site and strategically located in the downstream section of the contributing catchment, prior to discharging to the receiving watercourses. In addition, upstream of these proposed wetlands there will be a series of linked SuDS features that will work together to provide further source control and water quality treatment, prior to discharging to the wetlands.

The illustrative masterplan (ES Appendix 4.5) for the revised Otterpool Park OPA alone, includes over 60 ha of such open surface SuDS features, which will help to maintain the required permanent baseflow within the proposed wetlands, ensuring the efficacy of their nutrient removal. The water permanently stored in proposed wetlands and SuDS will form a part of a rainwater recycling strategy for non-potable usage within Otterpool Park to reduce potable water consumption. Therefore, this also enables the ability to circulate stored stormwater within the proposed linked SuDS and wetlands system to maintain sufficient baseflow for treatment efficacy, during periods of dry weather as required.

The treated effluent from the onsite WwTW will then be routed through the proposed Wetland W13, prior to discharging to the East Stour. The total footprint of this large wetland area is approximately 13.0 ha but only 75% of this is taken as effective treatment area (i.e., 9.75 ha) in Table 28 above to account for the earthworks required for constructing small cascade wetland features on 1 in 20 sloping existing ground. Wetland W13 is sufficient to treat the wastewater flows from the entire OPA site. However, additional wetland areas (W15 and W7) will be required in future to accommodate wastewater and stormwater discharges from the remaining 1,500 homes from the OFMA. Section 4.10 provides further detail on this.

The long-term adoption and management of the onsite WwTW, including the associated sewer infrastructure and wastewater wetlands system will be provided by STC. Similarly, STC has confirmed that they can adopt the proposed stormwater wetlands and strategic SuDS system at Otterpool Park. Therefore, this is the currently preferred approach for the long-term maintenance of storm water wetlands and SUDS but alternatively, a 'Company Limited by Guarantee' or 'Community Interest Company' can also take this responsibility if required, as explained in Section 5.4. The full details of adoption and maintenance arrangements and requirements for the proposed wetlands and SuDS will be confirmed ahead of discharging any relevant planning conditions.

4.9.2 Sellindge WwTW Option

Table 29 below summarises the indicative total area of the new wetlands required to offset the overall nutrient loading surplus shown in Table 26 for Sellindge WwTW. This shows that approximately 41 - 49 ha of additional wetlands will be required to achieve nutrient neutrality if this WwTW option is to be considered (i.e. to serve both the Otterpool Park FMP and Sellindge Phase 2 Sites).

Table 20	Watland Araa	Requirements	for Collindan	1A/a/TIA/
Table 29	vveliariu Area	Requirements	IOI Sellillade	

	PCC Rate – Scenario 1		PCC Rate – Scenario 2	
WwTW Option	Wetland for Area TN (ha)	Wetland for Area TP (ha)	Wetland for Area TN (ha)	Wetland for Area TP (ha)
Otterpool Park Framework Masterplan Only	29.9 (29.1)	46.4 <i>(42.2)</i>	26.8 (26.1)	43.6 <i>(39.4)</i>
Otterpool Park Framework Masterplan plus Sellindge Sites CSD9A and CSD9B	30.6 (29.8)	48.2 (44.0)	27.5 (26.8)	45.3 (41.1) *
	1	T		T
	U	pper Bound		Lower Bound

* This is after reducing the urban area by 61 ha due to the additional open space areas (including SuDS) provided in the illustrative masterplan (ES Appendix 4.5) outside the designated open space, but currently excluded in the Tier 1 OPA parameter plans (ES Appendix 4.2). SANG area is also increased by the same 61 ha accordingly.

4.10 **Preferred Wastewater and Nutrient Mitigation Option**

Table 14 provided a high-level appraisal of the two shortlisted WwTW options, which was then followed by further discussion in Section 4.5. Due to the scale of the proposed Development, the existing Sellindge WwTW will require a major treatment upgrade and there is zero capacity in the existing sewer network to send the extra flows from Otterpool Park without new offsite rising mains crossing HS1.

Section 4.6 and Section 4.7 showed that both options can satisfy the EA's discharge permitting quality parameters and will have negligible downstream flood risk impacts.

Section 4.8 and Section 4.9 then confirmed that to address the precautionary nutrient neutrality requirement to project Stodmarsh approximately 41 – 48 ha of new wetlands be required with Sellindge WwTW option, but the proposed Development has insufficient space to provide them without offsite mitigation. Whereas onsite WwTW option can achieve nutrient neutrality as well as increased biodiversity with a minimum of 25 ha of onsite wetlands and a minimum of 35 ha of onsite new woodland planting (which includes 8 ha of wet woodland), in accordance with the preliminary assessment presented in the earlier sections above. Therefore, onsite WwTW option is preferred and taken forward for further assessment, as described below.

The most recent feedback received to the draft wetland design from NE in their letter of 01st June 2021 also stated that further clarification is required on the nutrient neutrality calculations to demonstrate how Otterpool Park will be nutrient neutral for phosphorus. In particular, NE advised that if the interceptor values are being used then they will need to intercept the nutrients they are actually offsetting. Therefore, separating the nutrient budget values for land use and wastewater, and updating calculations for the wetlands that intercept these is essential to fully demonstrate neutrality.

To address this additional requirement, Table 30 below gives the updated nutrient budgets separately for land use and WwTW discharges with the Onsite WwTW option, using the worst-case PCC rate Scenario 1. This assessment is conservative as it currently ignores the reduced nutrient loading from circa 61 ha of the additional open space areas (including associated SuDS) that are provided in the illustrative masterplan (ES Appendix 4.5) within the development parcels, outside the designated open space (i.e., such areas are also treated as urban areas for the purpose of nutrient budget assessment).

	Land Use Discharge Only		WwTW Discharge Only		
WwTW Option	Nutrient Budget (kg/yr)	Wetland Area (ha)	Nutrient Budget (kg/yr)	Wetland Area (ha)	
Otterpool Park OPA only	-6,341 – for TN 140 – for TP	-6.8 - TN 11.7 - TP	7,623 – for TN 106 – for TP	8.2 - TN 8.8 - TP	
Otterpool Park Framework Masterplan Only	-6,285 – for TN 149 – for TP	-6.8 - TN 12.4 - TP	9,811 – for TN 136 – for TP	10.5 - TN 11.4 - TP	
Otterpool Park Framework Masterplan plus Sellindge Sites CSD9A and CSD9B	-6,547 – for TN 159 – for TP	-7.0 - TN 13.2 - TP	10,073 – for TN 140 – for TP	10.8 - TN 11.7 - TP	

Table 30 Refined Nutrient Budgets and Wetland Area Requirements for Onsite WwTW

The above shows that TP is the critical nutrient loading that will require mitigation for both land use and WwTW discharges, while there is a general betterment in TN loading already due to the change in land use after the development. It also shows that the total wetland area requirement of 24.9 ha to ensure the full nutrient neutrality the OFMA and Sellindge Sites CSD9A and CSD9B, should include 11.7 ha of wastewater wetland area and 13.2 ha of stormwater wetland area.

Following gives a further breakdown of the minimum estimated wetland area requirement to sufficiently remove the surplus TP loading from just the **treated WwTW effluent discharge**:

- Tier 1 OPA Development Only: 8.8 ha of wetland to remove a TP load of 106 kg/year
- Entire OFMA Development: 11.4 ha of wetland to remove a TP load of 136 kg/year
- Entire OFMA Development plus CSD9A and CSD9B: 11.7 ha of wetland to remove a TP load of 140 kg/year

Similarly, following values are the minimum estimated wetland area requirement to sufficiently remove the surplus TP loading from just the **land use discharge**:

- Tier 1 OPA Development Only: 11.9 ha of wetland to remove a TP load of 142 kg/year
- Entire OFMA Development: 12.4 ha of wetland to remove a TP load of 149 kg/year
- Entire OFMA Development plus CSD9A and CSD9B: 13.2 ha of wetland to remove a TP load of 159 kg/year

The proposed wastewater wetland W13 has an effective treatment area of 9.75 ha, which is sufficient to accommodate the Tier 1 OPA Development. The wastewater wetland W15 is 1.84 ha in size, which can easily provide the remaining 1.65 ha of wetland requirement to give a total effective wetland area of 11.4 ha (i.e., when the additional 1,500 homes from the OFMA come online later). Wetland W7 has a total area of 1.87 ha, which can be used to treat the additional wastewater discharges (i.e., to provide the extra 0.3 ha of wetland) from Sellindge CSD9A and CSD9B if necessary, assuming that these sites will be actually connected to Otterpool Park. Therefore, wetlands W13, W15 and W7 can provide a total effective wetland area of 13.46 ha, exceeding the minimum total wetland area requirement of 11.7 ha to completely remove the estimated total

TP loading of 140 kg/year from the entire extra WwTW discharge from the OFMA Development plus Sellindge CSD9A and CSD9B sites.

Similarly, to remove the land use surplus TP loading of 159 kg/year from the entire OFMA Development plus CSD9A and CSD9B Sellindge Sites will require 13.2 ha of wetland. The remaining proposed total wetland area (i.e., excluding W13, W15 and W7) is 15.3 ha, which is greater than the requirement of 13.2 ha. As highlighted in Section 4.9, the stormwater wetland requirement can be potentially reduced by another 4.2 ha, if the remaining 61 ha of additional SuDS and public open space in the urban development parcel areas are also considered in the detailed assessment. This is because, in accordance with NE's published guidance, SuDS and public open space will have lower nutrient leaching rates than the values currently been used for the urban areas.

Therefore, an onsite WwTW, operated by STC as the NAV, is chosen as the current preferred WwTW and nutrient mitigation option for the proposed Development. This is mainly because the ease of deliverability and the overall benefits it can provide are significantly higher than the new infrastructure and timescale needed to deliver Sellindge WwTW upgrade and rising mains, along with the delivery constraints and risks associated with the ongoing WINEP study impacts.

A letter is attached in Appendix G, which confirms that STC has now been formally appointed by Otterpool Park LLP to progress the Otterpool WwTW feasibility studies, enhanced outline design and EA discharge permit application. It also provides the following indicative timeline for completing these tasks:

- The six-month programme of water quality sampling and flow monitoring exercise will be completed by March 2022 with the final report due in April 2022, which will support the EA permit application submission by end of May 2022.
- The enhanced outline design of the WwTW will be available in March 2022.
- The permit is expected in May 2023 and the Ofwat application will then follow.

However, Sellindge WwTW could still be a viable and potentially attractive alternative option for the later phases of Otterpool Park, subject to a favourable outcome of the current WINEP study and any recommended extra water quality mitigation measures can be easily delivered, prior to the commencement of later phases of Otterpool Park. The onsite WwTW and the associated new sewers and pumping stations will be constructed in a modular fashion to match with the development phasing as described below, which will still allow for such later inclusion of Sellindge WwTW option, if deemed beneficial.

The onsite WwTW solution will be located in the north western portion of Otterpool Park (at Development Area HT.5) away from residential homes, near to the River East Stour. Approximately 160 m long x 60 m wide site compound (9,600 m² footprint) will be required for the buildings and treatment infrastructure. A maximum building height of 6.5 m is expected. However, this will increase to 7.5 m from the existing ground, including the handrailing on top of the reactors. STC will continue to optimise the configuration of the WwTW plant, but this will not have an impact on footprint or maximum building heights.

To accommodate the proposed delivery trajectory shown in Appendix A across the total 20-year duration of the Otterpool Park Framework Masterplan, four separate treatment streams will be built, in four distinct phases. A preliminary layout of the proposed WwTW plant and illustrative images showing the side views and elevations are included in Appendix J. The initial phase of the WwTW will be sized much smaller than the remaining phases to enable early commissioning of the plant from the first house of occupation.

The current STC onsite WwTW is based on the relatively new NUTREM® treatment technology. It is an activated sludge treatment process, which has been developed to include the integration of advanced process control and configuration with the same basic principles founded by Arden & Lockett over 100 years ago. The process is the result of an evolution of our tried and tested Pure Sequencing Batch Reactor (SBR) technology, updated to meet the emerging needs of our environment.

Appendix H provides an overview of the NUTREM® Process, which will typically involve the following key components:

- Main Inlet;
- Balance Tank/Fermenter;
- Booster System;
- Reactors;
- Sludge Thickening;
- Aerated Sludge Storage Tank;
- Final Effluent Discharge;
- Attenuation Tank;
- Final Effluent Disinfection and Polishing;
- Control Kiosk and Panel; and
- Alarm System and Remote Monitoring.

The NUTREM® process is a unique, compact and efficient Biological Nutrient Removal process. It offers a reliable and robust solution to nutrient removal, using purely biological treatment, but requiring a much smaller footprint and consuming less energy than more traditional Biological Nutrient Removal systems.

According to the product information available from Plantwork Systems (https://www.plantworksystems.com/nutrem/) the key advantages of the NUTREM® process over alternative solutions are:

- industry-leading level of TP removal (below 0.25 mg/l)
- industry-leading level of TN removal (below 5 mg/l)
- ability to meet 0.1mg/I TP with the addition of tertiary filters
- no dosing requirements
- effective in all seasons (i.e. including weak sewage strengths)
- lower capital expenditure
- lower operating costs
- smaller footprint, with resulting cost saving
- modular and scalable, allowing cost to be spread
- high quality effluent capable of re-use without tertiary treatment
- virtually odour free process; and
- no corrosive by-products.

The proposed plant will have covered a balance tank/fermenter in each treatment stream, which will significantly reduce any residual odour impacts. The detailed designs we would also include extra mitigation as appropriate – for example, a covered inlet works, covers on screenings skips and mandatory washdown of sludge tanker coupling point (with return drain).

The following water quality limits shown in Table 31 have been used for preliminary design of the treatment process, which meets the EA's indicative permit standards for the Onsite WwTW – Upstream Outfall Location @ NGR 609426 137712 (at Harringe Lane Bridge).

Water Quality Parameter	Units	Limit	Compliance
BOD ₅	mg/l	5	95%ile
TSS	mg/l	10	95%ile
NH4-N	mg/l	0.5	95%ile
TP	mg/l	0.1	Average Annual
TN	mg/l	7	Average Annual

Table 31 Indicative Discharge permit limits used for the preliminary design

As discussed in Section 4.6, an additional discharge permit with similar quality parameter values to those in Table 31, will be required from the EA to ensure that the excess DWF volume beyond 2,841 m³/day (i.e. up 984.1 m³/day) from the full Framework Masterplan can also be discharged at the downstream outfall location at the confluence with River East Stour and Horton Priory Dyke (NGR 608558 138047). STC is able lay the offsite outfall using its statutory powers under the Water Resources Act if required, prior to the trigger point for this offsite discharge outfall has been reached.

Consideration will need to be given to either providing temporary treatment or tankering of flows up to the point minimum DWF conditions are met to operate the plant (i.e., unless a relatively smaller initial treatment plant is constructed, which will also treat a small number of nearby residential homes in Barrow Hill or Sellindge, to maintain sufficient amount of initial flow to operate the plant from the day 1 of commissioning). Permanent or temporary diversion of some flows from the adjoining Sellindge WwTW catchment or temporary treatment would offer the most cost-effective and sustainable solution. Such temporary treatment options may include:

- Hire temporary treatment plant to provide treatment for the first portion of the flows required.
- Programme construction of the NUTREM® plant to facilitate the use of the aerated sludge storage tank to be operated as an SBR reactor for provision of temporary treatment. The relevant strategic Sewerage Pumping Station (SPS) is used as a temporary Balance Tank.

For any of the above options to be utilised, it would be necessary to obtain a temporary discharge permit from the EA, but this is likely to have less stringent quality parameters (i.e. reflecting the relatively small DWF volume to be discharged).

In addition, 0 provides the proposed nutrient neutrality mitigation strategy to protect Stodmarsh, which will provide further tertiary treatment to the final effluent using a large wetland, before discharging to the River East Stour.

Initial wetland designs shown in Table 28 have been further developed using a DTM model (based on LiDAR) as shown in Figure 8 to Figure 10. These wetlands were tested with ICM hydraulic modelling software to determine hydraulic loading, treatment volume/time, water depths and outflows for several design events as well as Time Series Rainfall (TSR) using the available local rainfall data, which covers the period from 1992 to 2019. This has confirmed that the proposed initial designs are satisfactory and will provide a robust foundation for subsequent detailed design of the wetlands, as part of the reserved matters.

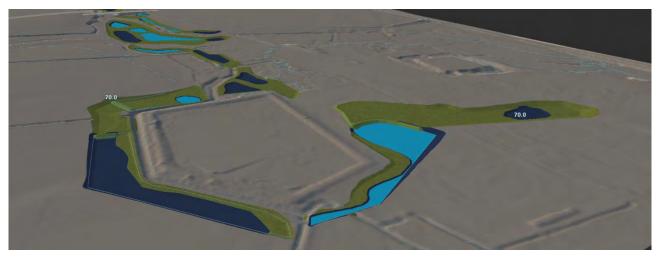


Figure 8 Proposed wetland features near to the existing Racecourse Lake/ Caste Park area

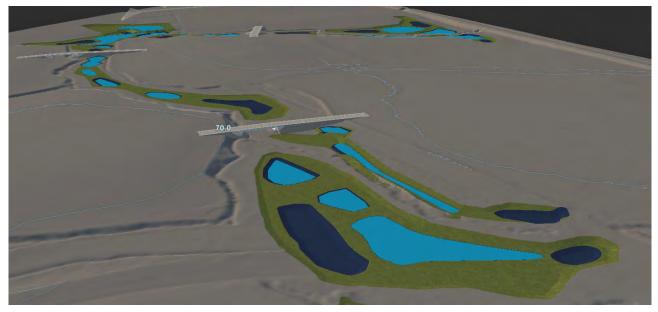


Figure 9 Proposed wetland features at Riverside Park area



Figure 10 Proposed wetland features at Barrow Hill Park area

Section 5.0 provides further details of these wetlands in terms of wider benefits (e.g. flood risk, water quality, water resource) with further analysis of ICM model results for 1 in 30 and 1 in 100 annual chance flood events.

The location of proposed onsite WwTW and its connecting sewerage and outfall infrastructure requirements (including supporting calculations) are shown in Appendix I. This includes:

- The onsite WwTW;
- The two main pumping stations (PS1 and PS2) and the connecting rising mains and gravity sewer network;
- A potential outfall connection from Sellindge Phase 2 sites to the onsite WwTW (i.e. subject to further discussions with the relevant developers and F&HDC; and
- The preferred outfall route from the tertiary treatment wetland to Harringe Lane Bridge and the additional outfall to the downstream location.

The current flows from the wider catchment will continue to be pumped from the existing Racecourse PS to Sellindge WwTW, with necessary separate advance sewer diversions being in place in areas where new development is proposed at Otterpool Park.

4.11 Summary

A key impact of the development on the water environment will be the variations in water quality and quantity discharged to receiving watercourses from Otterpool Park itself (surface water runoff) and the WwTW that serves the development. Therefore, water discharged from Otterpool Park will require careful management to ensure that the development does not have a detrimental impact on the water environment.

The results of the qualitative water quality analysis indicate that the proposed Development will not lead to a deterioration of WFD status or will compromise the achievement of WFD 'Good' status in the receiving watercourses, although tightened water quality parameters will be required for the new discharge permits to accommodate the proposed Development.

The WCS provides the impacts of the proposed development trajectory on the existing wastewater assets. There is no capacity in the existing sewer network to accommodate the proposed Development and therefore new rising mains (via HS1) directly to a substantially upgraded Sellindge WwTW will be required unless a new onsite WwTW is provided at Otterpool Park. While the new rising mains and Sellindge WwTW can be upgraded

this option is currently less favourable for achieving NE's nutrient neutrality requirement to protect Stodmarsh, with significant risk to Otterpool Park delivery programme.

WCS assessment confirms that onsite WwTW option is technically viable, and it is the current preferred solution for Otterpool Park. STC should make the EA discharge permit application for the onsite WwTW in spring/summer 2022 and Ofwat application as the NAV in spring/summer 2023.

This chapter also confirms that Otterpool Park Framework Masterplan even with the two CSR site allocations, CSD9A and CSD9B), can achieve Nutrient Neutrality using the Onsite WwTW solution with the associated wetlands and woodlands. The current minimum wetland area estimate of 25 ha is a precautionary estimate as advised by NE. For example, the urban area currently included in the nutrient budget assessment can be reduced by 61 ha if necessary, to account for extra public open space (including SuDS) within the urban parcels, as per the illustrative masterplan (ES Appendix 4.5). In accordance with NE's published guidance, SuDS will have lower nutrient leaching rates (i.e., similar to SANG) than the urban areas currently used, which means that the stormwater wetland requirement can be potentially reduced by another 4.2 ha, if this additional SuDS and public open space in development areas are considered in the detailed assessment.

This demonstrates that Otterpool Park, CSD9A and CSD9B site allocations in FHDC Core Strategy Review 2022) can achieve nutrient neutrality, protecting the integrity of the downstream Stodmarsh designated sites and thereby can meet the required tests under the HRA. A project HRA has also been prepared as part of this Tier 1 planning application (ES Appendix 7.19) to supplement F&HDC Core Strategy Review HRA Addendum: Nutrient Neutrality (December 2020) to confirm this. However, bespoke calculations and maintenance plans will be required at Tier 2 and Tier 3 stages to show the nutrient removal values of the proposed wetlands can be achieved on site, in order to clearly demonstrate how nutrient neutrality will be achieved and managed at Otterpool Park over its design life.

Section 5 below provides further discussion on the preferred wastewater and sewerage strategy, as part of the proposed integrated water management strategy.

5 Integrated Water Management Strategy

5.1 Flood Risk Management

Figure 11 illustrates the key features of the existing site drainage system along with the ground levels defined by lidar. The surface water runoff from the existing site drains into the River East Stour through several small drainage tributaries, with the River East Stour finally leaving the site via a culvert under Harringe Lane on the north-west boundary. The North Lympne Drain and the Harringe Brook act as natural drains from the south-east and west areas of the site, respectively.

A network of drainage ditches is present within the grounds of the former Folkestone Racecourse, which collects the surrounding surface water, directing flows around the existing Racecourse Lake at its southern boundary, before continuing west towards the North Lympne Drain and the River East Stour. The North Lympne Drain meets the River East Stour downstream of the Racecourse Ditch system.

In addition to the named watercourses, several culverts are present within, and adjacent to, the development area along the River East Stour through the CTRL, Folkestone Racecourse track and along Barrow Hill. Similarly, several other culverts are present on the smaller site drainage tributaries at the existing access crossings.

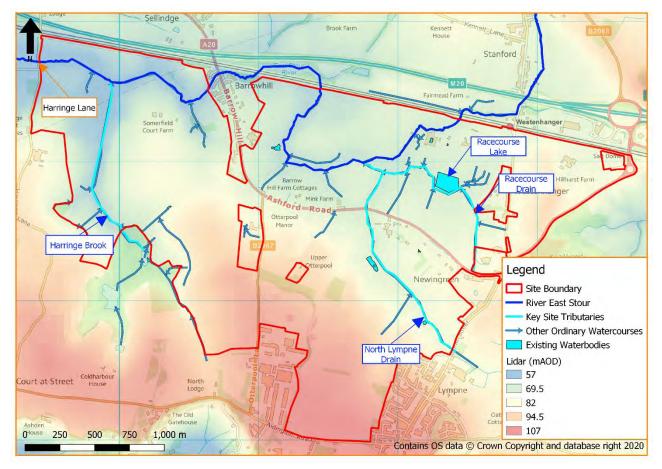


Figure 11: Existing site drainage system. (The planning Application Site boundary is outlined in red.)

Flood risk from all sources has been assessed in a separate FRA report with the following main conclusions:

• **Fluvial**: the majority of the site currently lies in EA Flood Zone 1, with flooding chance of less than 1 in 1000 annual chance flood event . Through the northern half of the site, there are extents of Flood Zones 2 and 3 associated with the River East Stour main river. No built development is proposed

within these zones. Appropriate mitigation is required as proposed for the key bridge crossings over the River East Stour and associated tributaries.

- **Surface Water**: limited areas of the site are at a potential risk of flooding from surface water, these areas follow the alignments of the North Lympne Watercourse, the Harringe Brook and the River East Stour and the associated contributors to these watercourses. Through a considered surface water strategy both on and off-site surface water, flood risk would be sustainably managed, and the risk mitigated.
- **Groundwater**: Most of the site lies upon a section of the Lower Greensand Group which is a highly productive aquifer and significant intergranular flow, therefore the site is located within a generally low-risk area. The development proposals are unlikely to include any significant subterranean elements except for the proposed shallow SuDS features and nutrient mitigation wetlands.
- **Artificial and Sewer**: The development proposals will discharge directly into existing watercourses. No significant flood risk is associated with the artificial sources including reservoirs.

The FRA and SWDS has been submitted as Appendix 15.1 to the Otterpool Park Environmental Statement. Therefore, a reference to this document should be made for the full detail on flood risk and surface water management, along with the relevant chapters in the Environmental Statement.

FRA & SWDS Report details the site-specific river modelling and groundwater modelling undertaken to assess the baseline situation and the development impacts, accounting for the latest climate change allowance. As per the NPPF, the sequential test and sequential approach have been applied to locate the built parts of the proposed Development into the lowest flood risk areas. The exception test has been applied to the key bridges over the River East Stour (see Figure 12 below). The modelling of the proposed key river crossings, existing culvert removals, floodplain enhancement measures, wetlands and SuDS has evidenced that the proposed Development will be safe from flood risk over the design of 100 years and it will not increase offsite flood risk. The integrated flood risk and water management strategy will reduce peak river levels in the downstream river reaches.

Figure 12 to Figure 14 below illustrates an example of the development of proposals for the River Park.

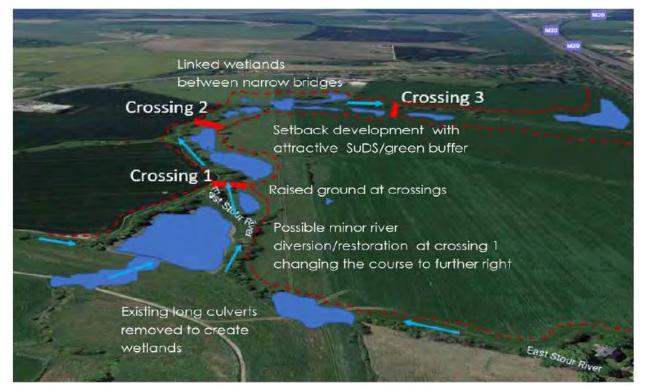


Figure 12 Preliminary proposals for the River East Stour Corridor – integrated bridge crossings and wetlands in landscaped linear river park



Figure 13 Latest proposals for the River East Stour Corridor – bridge crossing 1 and integrated wetlands in landscaped linear river park



Figure 14 Latest proposals for the River East Stour Corridor –bridge crossing 2, bridge crossing 3 and wetlands in landscaped linear river park

5.2 Surface Water Management

5.2.1 SuDS Concept and Principles

SuDS are methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques. The development could have a significant impact on flood risk downstream if SuDS principles and strict controls on runoff are not enforced. Opportunity should be taken by F&HDC and developers to incorporate techniques such as these at the development, in order to comply with the Building Regulations, NPPF and local policies implemented by both F&HDC and KCC.

In line with SuDS principles, the destination for surface water runoff that is not collected for reuse should be prioritised in the following order:

- a) Infiltration;
- b) Discharge to surface waters;
- c) Discharge to surface water sewer, highway drain or another drainage system; then
- d) Discharge to a combined sewer

Arcadis Phase 1 and Phase 2 ground investigation (including other available ground information data) show that some parts of the site are suitable for shallow infiltration-based SuDS, and there are no defined Source Protection Zones by the EA within the site. If further localised tests suggest that there is suitable permeability, developers and F&HDC in consultation with the LLFA and EA should maximise shallow infiltration-based SuDS techniques, and develop suitable designs that take account of any nearby Source Protection Zones and those principal and secondary aquifers within the site, that may be vulnerable and ensure that the risk of pollution is adequately controlled.

A concept SWDS has been developed for the Otterpool Park to show how the impact of the development will be reduced through SuDS techniques, with surface water run-off rates attenuated according to Kent County Council's SuDS Guidance local design standards as well as CIRIA SuDS Manual³⁰.

The Otterpool Park will aim to be an exemplar site with provision of SuDS and multi-functional green space promoting WSUD principles, to ensure that flooding is accounted for and mitigated wherever possible, while reducing extra potable water demand and maximising overall environmental benefits. The water management strategy will include an interconnected network of well-designed and managed onsite swales, basins, ponds and wetlands with dedicated outfalls within site boundary in agreement with the EA and LLFA to collect, treat, infiltrate, transport and store water.

This system of drainage will manage and reduce flood risk by limiting development runoff below the current greenfield rates during extreme events and will maximise available water resource from rainfall during the normal events. The drainage strategy will also ensure green space and properly landscaped SuDS are allocated to permeate the development, providing aesthetic and biodiversity benefits to residents while providing the most efficient multifunctional form of SuDS.

Innovation really occurs in the development of a holistic approach to a SuDS train (a network of different SuDS) from the outline design. Where possible, the sites natural hydrology would be used to inform design decisions and guide the character of the public realm. SuDS and blue-green infrastructure have been integrated into the wider masterplan strategy, providing multi-functions and benefits.

FRA&SWDS¹ illustrates a range of SuDS components (including green roofs/walls, rain gardens, soakaways etc.) which should be used, including their expected benefits and potential application. For example, the construction of green roofs could result in a reduction of runoff occurring from roof surfaces, through

³⁰ Kent County Council Guidance available at

https://www.kent.gov.uk/__data/assets/pdf_file/0007/23578/Masterplanning-for-SuDS.pdf and Ciria Manual at https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

absorption, and evaporation by the rooftop vegetation. The reduction in impervious surface could also provide benefits in reducing the speed of runoff and providing water quality benefits through filtration and bio-retention. Green roofs also have the potential to provide a range of wider benefits, including provision of habitat for biodiversity, improved air quality, recreational and amenity benefits and amelioration of the urban heat effect. Living walls and green facades may also be suitable for installation and provide similar functions and benefits as green roofs.

By considering SuDS early in this way, as in this integrated water management strategy, they can provide a more meaningful contribution to controlling runoff rates, improving water quality and increasingly provide a source of water reuse in the most cost-effective way.

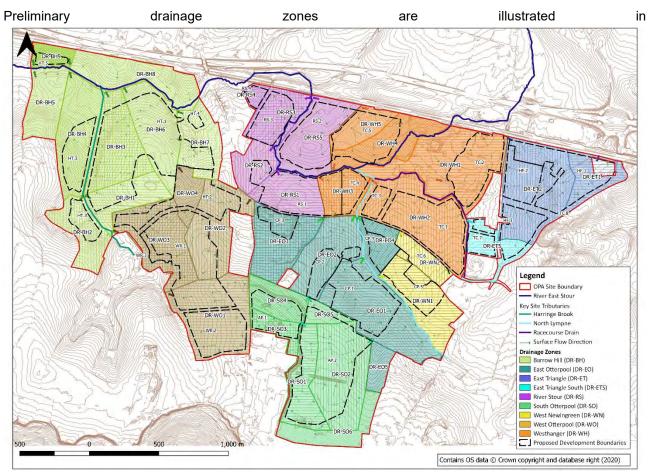


Figure 15 and identification of these zones reflects the existing site topography and proposed features (e.g. key access and drainage corridors) across the development areas. Each drainage zone is further divided into drainage sub-zones for the purposes of developing the SWDS (see also Appendix J). These drainage zones along with their corresponding discharge rates (both existing and proposed) and indicative outfall locations, that have been agreed with the LLFA are presented in 0.

This information provides the basis for the concept site-wide surface water drainage strategy at this Tier 1 Outline Planning Application Stage. Further refinements to this will be required as more detailed development layouts and design information become available at Tier 2 and Tier 3 planning stages.

It is also essential to ensure the integration of water is not lost in other, less-permeable, parts of the masterplan. Therefore, it will be important to secure these source control SuDS measures as appropriate through planning conditions and the Section106 as well as through the next stage of the detailed WCS for each phase.

Otterpool Park Environmental Statement Appendix 15.2 - Water Cycle Study

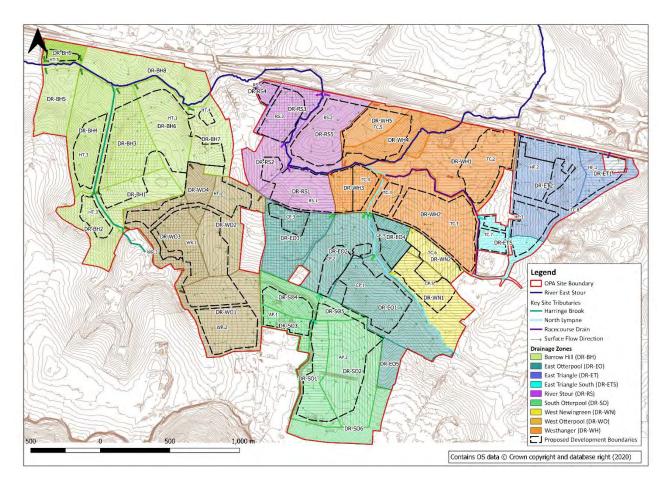


Figure 15: Preliminary drainage zones

The following key design considerations have been applied in developing the conceptual surface water drainage strategy, which will need further attention as the detailed surface water drainage strategy is developed:

- The proposed strategy has evidenced what attenuation storage is required to ensure the Application Site does not exceed Greenfield discharge rates for up to 1 in 100 annual chance flood events including 40% allowance for climate change. The development masterplan currently has provided sufficient space to accommodate the required SuDS storage ahead of each respective phase and this should be monitored and safeguarded;
- At some drainage zones it may be possible to provide extra storage to accommodate a much tighter allowable post-development discharge rate of 2 l/s/ha (which is approximately equivalent to twice as 1 in 1 annual chance flood event greenfield runoff rate) for all annual flood events, without applying a staged discharge approach to deliver downstream flood risk benefits but it is important that 50% drain-down times are not excessively long and prohibitive for dealing with follow-on smaller storm events;
- In other drainage zones, post-development runoff rate will be limited to the corresponding greenfield runoff rates or a tighter rate of 2 l/s/ha (i.e. subject to ground infiltration capacity and available SuDS space), using a staged outfall arrangement system;
- Strategic long-term SuDS storage can be designed in order to provide multi-functional benefits;
- Although there is sufficient space within the Application Site for strategic long-term attenuation storage provision, infiltration is the primary choice for surface water discharges where ground conditions are favourable with permeable soils. Therefore, infiltration potential should be established as part of the detailed design with further site investigation and the surface water drainage should be modified, to maximise use of this method of surface water management;
- Following confirmation of the detailed surface water drainage strategy a maintenance, operation and adoption schedule should be drawn up in consultation with key stakeholders including: the LLFA, Highways Authority, EA, NE and SW;
- Site-specific exceedance event flow routes should be established as part of the detailed drainage strategy, this should also confirm that the built development does not experience any flooding during events up to a 1 in 30 annual chance flood event, while no property flooding will occur for 1 in 100 annual chance flood event (inclusive of 40% climate change and 10% urban creep allowances); and
- Mitigation measures may be required within the detailed drainage design to ensure land use legacy issues do not negatively impact the water environment.

5.2.2 Blue-Green Infrastructure Integration

The proposed conceptual surface water drainage strategy, which shows the existing watercourses, watersheds and ponds and the proposed conveyance routes, storage ponds, infiltration areas and detention areas can be seen in Appendix J.

This shows that the majority of the SuDS components has been incorporated within the allocated space for SuDS within the Green Infrastructure space that is designed throughout the development to provide areas for increased biodiversity, education and awareness, and water sensitive behaviour. This includes the green corridors between housing parcels that will provide areas for surface water conveyance, treatment, infiltration and long-term attenuation storage.

Green infrastructure, ecology and water management strategies have been aligned to support well integrated proposals that will help enhance ecosystem performance, increase natural drainage capacity, maximise natural capital benefits while minimising flood risk. The combined strategies aim to support the following overarching key green infrastructure principles.



Principle 1: Integrate Blue and Green Infrastructure

Build on the multiple benefits of integrating green and blue infrastructure in order to make the best use of space and by doing so create additional benefits which enhance the performance of the natural systems.



Principle 2: Promote Health and Wellbeing

Create a healthy place with green infrastructure close to home, accessible to all both physically and visually, connecting people to nature with walkable/cyclable routes, providing spaces for sport, growing healthy food and quiet contemplation.



Principle 3: Build Resilience

Help to build a resilient place, with green and blue infrastructure linked as part of an ecosystem. Support the design and management of spaces to increase benefits such as natural flood management and drainage capacity. Consider the monitoring and control of invasive species and plant disease which may have a negative impact on green infrastructure.



Principle 4: Create Strategic Open Spaces

Shape communities around strategic open spaces. Create a network of green spaces that help integrate communities into the natural surroundings and respect the local heritage.



Principle 5: Improve Connectivity

Increase accessibility, visibility, and wayfinding, to help make Otterpool Park a walkable place, connecting it with existing neighbouring settlements and beyond. Consider the connections between habitats within and beyond Otterpool Park. Consider movement corridors as spaces; create a range of uses within the corridors and integrate green infrastructure elements, managed appropriately to balance sharing of space between people and wildlife.

Figure 16: Green Infrastructure Principles³¹



Principle 6: Enhance Biodiversity

Support the creation and management of valuable biodiversity spaces, through the promotion of native and locally occurring species, deterring invasive plants and encouraging pollinator species whilst balancing wildlife and recreation.

Principle 7: Positive Planting

Draw on impact study finding to guide a planting framework that contributes to local character, adds to sense of place and helps with orientation.

Principle 8: Measure Performance

Advocate monitoring and measurement, and the evaluation of green infrastructure performance, such as additional studies and surveys to future-proof against loss, erosion or reduced performance.



Principle 9: Green Infrastructure at all Scales

Ensure that green infrastructure is woven through Otterpool, from gardens and balconies, through river and wildlife corridors, local and larger strategic parks, and connecting with the wider countryside.



Principle 10: Towards Climate Change

Use green infrastructure to mitigate and adapt to climate change. Advocate reduced carbon through growing food locally, managing temperature, water supply, river and surface water flooding, reducing erosion and helping other species to adapt.

Principle 11: Engaging the Community



Provide a platform for community care and investment, flexible spaces accommodating organised community events, and spaces which encourage environmental management and stewardship, such as community managed orchards and allotments.

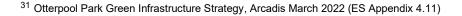


Figure 17 shows how the green and blue infrastructure proposals have been produced for the proposed Development, by building on the above principles.



Figure 17: Green and Blue Infrastructure Proposals³¹

5.2.3 SuDS Storage and Treatment Train

In areas outside of the allocated green infrastructure, other SuDS components will be incorporated to manage surface water on a more local level, such as within housing parcels and business parks. This will include swales, soakaways and permeable paving, which will provide localised surface water management at the property level. These components may not be accounted for within the wider storage requirement calculation, however, may provide a localised safety factor for surface water management.

Additional, or allocated storage will also be incorporated into the surface water management plan at the plot levels within development parcels as required to intercept and treat the pollutants that occur due to the 5 mm 'first flush' following a storm event after a dry spell. This will reduce the risk of river pollution from urbanisation. Therefore, it is expected that approximately 10% storage volume will be generally provided at source near to the development parcels, including soakaways, permeable paving, rain gardens and swales where appropriate. Wetlands, ponds and canals will also be situated at some selected locations to provide areas for surface water attenuation and to reduce the flow rates within the development while enhancing ecology, amenity, water resources, water quality and place making.

To reduce the downstream flood volumes on the River East Stour and amount of surface water that is to be stored above ground onsite, and to refill the groundwater supplies, infiltration areas will be included within the surface water management strategy where the ground is permeable. Examples include within the southern portion and the strip of land from Otterpool Lane and Barrow Hill towards the River East Stour whereby the soils and Hythe Beds present the best conditions for sufficient infiltration. Detention Areas will be designed in areas that require a buffer from flood sensitive zones, this includes up to a 25 m buffer either side of the River

East Stour, throughout the length of the development and in areas where a permanent watercourse is located near to housing parcels, such as the west border of the development area.

Preliminary attenuation storage requirements have been calculated for 1 in 100 and 1 in 30 annual chance flood events using the equivalent greenfield discharge rates as well as with a much tighter allowable discharge rate of 2 l/s/ha (i.e. where ground infiltration capacity is more favourable), which is approximately double the 1 in 1 annual chance flood event greenfield rate. As well as ensuring the sufficient space storage it is essential that these SuDS features do not have excessively long 50% drain-down time to accommodate successive rainfall events, avoiding onsite residual flood while reducing downstream flood risk. During a flood event of up to a 1 in 100 annual chance event (inclusive of climate change), no specific actions are required to provide additional protection to the development as sufficient protection will be incorporated within the drainage strategy.

Table 32 and Appendix J summarise the long-term SuDS storage and space requirements (both at Drainage Zone and Drainage Sub-Zone Levels) along with 50% drain-down times, which will require further appraisal during the detailed design. This table shows that the proposed Development currently has an overall surplus of approximately 17.7ha of SuDS strategic space within the allocated strategic green infrastructure space, assuming the average SuDS storage depth is 1.0m.

However, drainage sub-zones WH2, WH5, WN1, WN2, ET1, ET2, ETS, SO4, WO2, WO4, BH2, BH5 and RS1) will have a small shortfall in SuDS provision (between 0.05ha and 0.8ha or 350m³ and 5,600m³) unless the depth of the features is slightly increased. Two alternative strategies exist to mitigate for this shortfall:

- Provision of excess storage in hydraulically connected drainage sub-zones downstream. These downstream drainage sub-zones are required to be constructed ahead of the respective drainage sub-zones for which a shortfall in SuDS storage is predicted.
- Provision of additional attenuation storage at development parcels and roadside swales which are currently excluded in the high-level assessment presented in this report.

The agreed phasing plan with the LLFA will ensure that the full storage requirement is met ahead of any upstream development runoff is discharged.

At some Development Zones (i.e. West Hanger, East Triangle, East Triangle South, West Newingreen and River Stour) where good infiltration rates are not available 50% SuDS drain-down time exceeds the normally recommended 24 hours maximum limit. However, a significant surplus of SuDS volume storage is already provided in other drainage zones to offset this longer drain-down times and managing the potential flood risks from any consecutive flood events.

Further long-term attenuation storage (e.g., between 10,000 and 15,000m³) could also be made available for at the existing Racecourse Lake during such follow-on flood events, as this extra storage is currently excluded in Table 32 and Appendix J. However, this would require temporary pumping into the existing lake from the proposed drainage system because of the existing level differences between the existing base of the lake and Racecourse Drain, and the lake is also fully enclosed by an earth bund. The FRA&SWDS¹ provides further details on the existing lake and its former pumping facilities, including potential suggestions on how temporary pumping and active flow management can be used to provide additional long-term flood storage and water reuse as part of the development proposals.

The different SuDS components that have been explained above have been designed so that they provide a sufficient treatment train, which does not decrease local water quality. As well as a surface water management strategy that mimics natural drainage and utilises local topography and ground conditions it provides a functional drainage strategy that does not increase the local flood risk.

There is sufficient green space, incorporating extensive SuDS and integrated water management solutions to manage onsite and offsite flood risk following the proposed development, which can be implemented in a phased manner as part of the strategic infrastructure, in advance of the main development construction. Opportunities have been exploited to ensure multiple benefits are delivered in terms of integrated sustainable drainage, green infrastructure, amenity, biodiversity and WFD status.

As described in Section 4.10, further tertiary treatment will be provided within proposed extra storm wetlands that are specifically designed to achieve nutrient neutrality to protect downstream Stodmarsh Lakes European

Sites to satisfy Natural England's requirements. These storm wetlands are generally located towards the final section of the SuDS train (i.e. prior to discharging to the existing watercourses) to specifically intercept and treat the pollutants that occur due to the 10 to 15 mm 'first flush' following a storm event after a dry spell. This will avoid the risk of river pollution and harmful nutrients (e.g. Phosphorus and Nitrogen) impacting the Stodmarsh Lakes due to the proposed Development.

Drainage Zone	Average Atte Storage Req including 40% change allow	uirement, % climate	SuDS Space with 1.0m Ave (ha)	and the second	Available Strategic SuDS	SuDS Area Surplus/ Shortfall for attenuating 1 in 100				
	1 in 100 annual chance	1 in 30 annual chance	1 in 100 annual chance	1 in 30 annual chance	Space in Application Site (ha)	annual chance event (ha)				
Westenhanger	70,835	53,333	9.21	6.93	12.11	2.90				
East Otterpool	33,277	23,512	4.33	3.06	7.30	2.97				
West Newingreen	20,445	15,407	2.66	2.00	1.49	-1.17				
East Triangle	36,548	27,486	4.75	3.57	4.32	-0.43				
East Triangle South	7,348	5,526	0.96	0.72	0.89	-0.07				
South Otterpool	35,454	25,447	4.61	3.31	7.13	2.53				
West Otterpool	63,151	43,659	8.21	5.68	11.16	2.95				
Barrow Hill	42,804	30,542	5.56	3.97	9.56	4.00				
River Stour	47,318	35,627	6.15	4.63	10.19	4.04				
Total	357,177	260,536	46.43	33.87	64.15	17.72				

 Table 32 Long-term SuDS Storage and Space Requirement at Drainage Zone Level

5.2.4 Downstream Flood Impacts

Figure 18 and Figure 20 below show the total flow hydrographs, extracted from the ICM model, on the River East Stour at Harringe Lane bridge for the baseline and proposed design scenarios for a 1 in 100 + 40% climate change annual chance event for 8.0 hour and 12.5 hour storm durations. These hydrographs, indicate a total peak flow reduction of 4.01m³/s (36%) and 7.07m³/s (33%) respectively when compared with the corresponding baseline event. There is also a slight reduction in total flood volumes 42,676m³ (3%) and 43,946m³ (2%) for the same 8.0 hr and 12.5 hr storm event over the seven-day period shown in these graphs after the reduced flood peak. The slight decrease in total volume is mainly due to the extra SuDS infiltration and attenuation storage provided with a tighter allowable discharge rate of 2l/s/ha (i.e. compared to 3l/s/ha greenfield rate). The additional flood attenuation storage provided by the proposed wetlands also helps to reduce the peak flood flows.

A sensitivity test was undertaken modelling the wetlands with an initial water level 300mm above the ground level of the wetlands. The effects of this test were to cause a negligible increase of the peak design flows, at

the downstream end of the model (by 0.21m³/s and 0.11m³/s for the 8.0 hour and 12.5 hour storm durations respectively), keeping them well below the baseline values. The reduction in flood volume slightly eroded, however the percentage reduction from the baseline did not change for both storm durations.

It should also be noted that this is currently a conservative assessment due to the following key reasons:

- A Factor of Safety between 10 to 33 has also been currently applied to the infiltration rates where infiltration-based SuDS are considered generally feasible. Therefore, if higher infiltration rates than these modelled values are proven by further detailed site investigation then the predicted post development flood volume discharge to River East Stour will reduce to account for increased infiltration discharge losses to the ground;
- The delayed time response through the extensive sequentially linked upstream SuDS systems (SuDS features at plot, roadside and strategic level) has been discounted in this preliminary modelling exercise because the ICM model did not explicitly represent these discrete features at a level sufficient to enable an accurate assessment of travel time and individual attenuation effects. The MicroDrainage quick storage estimate methodology applied to derive the total SuDS storage requirement for each post development drainage sub-zone has been input as a lumped storage node in the ICM model along with standard urban drainage modelling methods and a simplistic staged outfall arrangement, limiting the total outflow from the storage node to the required 1 in 30 and 1 in 100 annual chance allowable discharge rate;
- It has been assumed that all permanent waterbodies within each wetland are completely full, prior to the commencement of the storm event; and
- Infiltration discharge losses from the remaining plot level SuDS and roadside swales are currently not modelled in the ICM model.

Therefore, it is expected that the predicted volume decrease may further improve when further detailed modelling is undertaken during Tier 2 and Tier 3 application stages, using the updated site layouts, drainage designs and infiltration rates (with reduced Factor of Safety).

Note that the ICM modelling currently excludes the additional 38l/s of extra effluent discharges to the River East Stour from the proposed onsite WwTW (due to the proposed Development included in the current Tier 1 Outline Planning Application), which can add another 22,982m³ of Dry Weather Flow volume to the total post development flood volume. However, even with this extra Dry Weather Flow, the total post development flood volume is still less than the baseline flood volume (because this DWF increase is still < 42,676m³ and 43,946m³ volume reductions discussed before). Furthermore, 38l/s Dry Weather Flow constitutes a very minor proportion of the flood flows in the River East Stour (i.e., 2% of QMED and 0.3% of the 11hr catchment duration 1 in 100 annual chance flood event) and therefore considered to have a negligible impact on the downstream flood risk.

Figure 18 and Figure 20 below also provide the breakdown of:

- Total stormwater inflows to wetlands from the proposed SuDS;
- Total stormwater outflows from the proposed wetlands directly to the watercourses; and
- Total stormwater outflows from the proposed SuDS directly to the watercourses

Figure 19 and Figure 21 then show the proportional distribution of total runoff volume discharged to the watercourses from the SuDS and wetlands in Otterpool Park and other non-Otterpool Park discharges, for the 1 in 100 annual chance event plus 40% climate change, 8 hr and 12.5 hr storm durations. They also show the breakdown of total stormwater flows to the watercourses directly from the wetlands and the proposed SuDS.

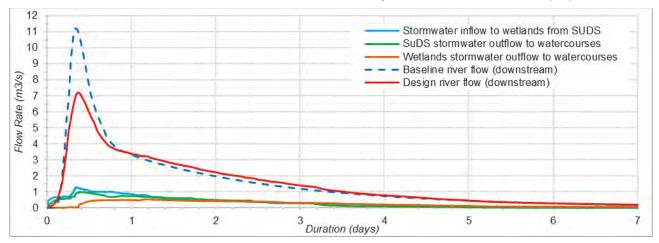


Figure 18: Flow hydrographs for 1 in 100 + 40% Climate Change annual probability 8 hr storm duration event

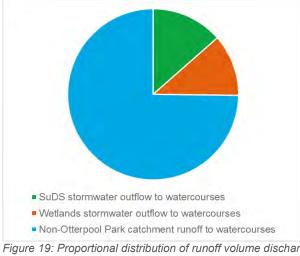


Figure 19: Proportional distribution of runoff volume discharges to watercourses for 1 in 100 + 40% Climate Change annual probability 8 hr storm duration

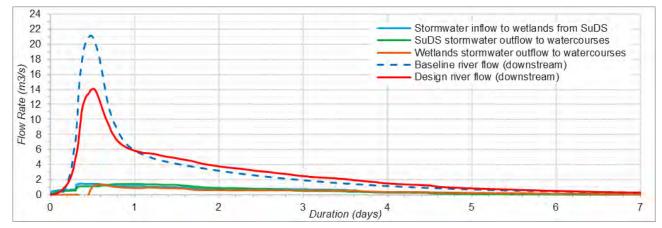


Figure 20: Flow hydrographs for 1 in 100 + 40% Climate Change annual probability 12.5 hr storm duration event

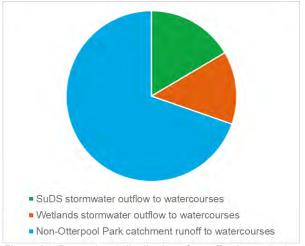


Figure 21: Proportional distribution of runoff volume discharges to watercourses for 1 in 100 + 40% Climate Change annual probability 12.5 hr storm duration

As mentioned before, a temporary pumping from the proposed drainage system to the Racecourse Lake or would be another potential option to increase the long-term attenuation storage provision. Furthermore, a key component of the proposed integrated water management strategy is to minimise any residual increased overall flood volume impacts on the downstream Aldington FSR due to the proposed Development during successive rainfall events in unusually wet periods.

Therefore, further hydraulic modelling during Tier 2 and Tier 3 Planning Application Stages, incorporating extra DWF from the onsite WwTW as well updated site layouts, drainage designs and infiltration rates (with reduced Factor of Safety) is recommended to refine the current integrated water management strategy.

5.3 Water Reuse

5.3.1 Rainwater Harvesting

Utilising some (and at times of peak demand, most) of the collected surface waters for non-potable uses within the Otterpool Park development, should result in an overall reduction of surface water discharge to the local water environment during large flood events. This should form an important point for consideration for catchment flood management planning, and may warrant further review and appropriate design development.

The proposed interlinked ponds-wetlands system and the existing Racecourse Lake that are located in the north-eastern and central parts of the proposed Development, which comprise less permeable ground where more high dense housing and town-centre related uses are also located, provide an ideal opportunity to implement a centralised rainwater harvesting solution, as part of the proposed integrated water management strategy.

Currently, the average daily per capita consumption of potable water within the Affinity Water supply region is 129 litres. However, around half of this water isn't used for drinking or personal washing purposes, despite being of a drinking water standard. The southeast of England is classified as a water-stressed region with a long- term water supply-demand imbalance. As mentioned in Section 2, Affinity Water is forecasting a deficit of 3.8 mega litres per day within their Water Resource Zone 7 (i.e. home to Otterpool Park) by 2045/47, which is expected to reach 11.2 mega litres per day by the end of their planning horizon of 2080.

The potential onsite treatment options for rainwater harvesting vary depending on two main factors:

- Sources of water if highway drainage is to contribute to the system, oil interceptors and reedbed filtration may be required; and
- Desired quality of water if water is to be used for spray irrigation (i.e., where aerosols are likely) then disinfection may be needed. Disinfection is achieved by using one, or a combination of the following systems; ultraviolet radiation, ozone dosing, or chlorine dosing. All three forms of disinfection system are common within the water sector and are available in small package plant kiosks. Ultraviolet

radiation needs power only, while the others add chemicals to the water which some irrigation systems may prohibit using them as they add chemicals to the ground.

In Otterpool Park there are no plans for extensive spray irrigation and therefore the wetland treatment with the proposed reedbeds, is likely to be sufficient.

The existing racecourse lake can provide a maximum storage of approximately 37,570 m³ to the existing spillway level of 71.27 mAOD or 22,944 m³ with the proposed lowered spillway level of 70.40 mAOD (see FRA&SWDS for further detail on the lake capacity). Therefore, this together with the nearby proposed wetlands/ponds in Castle Park and Riverside Park can provide further permanent water storage of up to 76,263 m³ or 61,637 m³. It has been assumed that 30% of available storage may be lost due to evapotranspiration in dry periods and therefore the remaining storage could be potentially available for reuse purpose. This gives a total effective storage volume of 53,384 m³ for reuse purpose or 43,145 m³. However, further modelling is required during Tier 2 and Tier 3 stages to confirm this, while accounting for the evapotranspiration and ensuring sufficient baseflows in the downstream wetlands to maintain their amenity, ecology and water treatment functions during dry periods.

Therefore, a centralised non-potable rainwater harvesting system present an opportunity to further reduce the current minimum potable water supply requirement of 110 l/p/d as follows:

- **Option 1**: 18.5 l/p/d (for toilet flushing and garden watering)
- **Option 2**: 35.7 l/p/d (for toilet flushing, garden watering and washing machine)

	Dwellings (No)	Peak Water Reuse Demand (m³)												
Development Area		1 day	30 days	60 days	90 days									
Town Centre & Castle	1,975	132	3,946	7,892	11,838									
Hillhurst Farm	547	36	1,093	2,186	3,279									
River Stour	1,495	100	2,987	5,974	8,961									
Total	4,017	268	8,026	16,052	24,078									

Table 33 and Table 34 below show the potential domestic peak demand for the above two water reuse options for some targeted development zones that are within reasonable proximity to the available water storage features in Castle Park and Riverside Park area. An additional Factor of Safety of 1.5 has also been applied to account for the potential peak and seasonal variations.

Table 33 Water Reuse Supply Demand Requirement for Option 1 (includes FoS of 1.5)

	Dwellings (No)	m ³)	_		
Development Area		1 day	30 days	60 days	90 days
Town Centre & Castle	1,975	132	3,946	7,892	11,838
Hillhurst Farm	547	36	1,093	2,186	3,279
River Stour	1,495	100	2,987	5,974	8,961
Total	4,017	268	8,026	16,052	24,078

Development Area	Dwellings (No)	Peak Water Reuse Demand (m³)											
		1 day	30 days	60 days	90 days								
Town Centre & Castle Park	1,975	254	7615	15230	22844								
Hillhurst Farm	547	70	2109	4218	6327								
River Stour	1,495	192	5764	11528	17292								
Total	4,017	516	15,488	30,976	46,464								

Table 34 Water Reuse Supply Demand Requirement for Option 2 (includes FoS of 1.5)

This indicates that the above Development Areas can be potentially supplied between 60 and 90 days in dry periods with both options before the potable water back up system is required. This is because a total effective storage volume of up to 43,145m³ is potentially available for reuse purpose within the Racecourse Lake and nearby proposed wetlands/ponds in Castle Park and Riverside Park based on the current development proposals. Therefore, it is recommended that subject to further detailed analysis, design and financial viability of providing the dual pipe system and pumping facilities, a centralised rainwater reuse system (i.e., in conjunction with a potable water back up system) for the above targeted development zones is implemented. This will enhance the climate resilience on existing water resources as well minimise the predicted increase in total flood volumes (see Section 5.2) that will enter the River East Stour during infrequent flood events.

As discussed in the FRA&SWDS Report¹, there is already an abstraction licence issued to F&HDC within the Site to abstract water from a location (NGR 611730, 137000), near to the proposed wetlands W12, W11 and W8. This licence has been operational since 1966 for the purpose of spray irrigation storage at the former racecourse and the licence was transferred to F&HDC in 2020. It has a daily maximum licenced quantity of 909.2m³ and maximum annual licenced quantity of 36,368m³.

The information supplied by the EA shows that the maximum abstracted volume was 32,760m³ in 2003-2004 and no water has been abstracted since 2013. Local knowledge also suggests that the former pump was decommissioned in 2014 and it was previously used to abstract water from a local well/borehole and pump into the Racecourse Lake, ahead of the spring/summer race season, using the metal rising main (220mm outside diameter) shown in Figure 22.

Therefore, this abstraction licence and rising main can be potentially used with a new pumping facility located at wetland W8 or W12, to store water at the Racecourse Lake and reuse within Otterpool Park. However, further abstraction licenses will be required from the EA to abstract the stored water from the proposed wetlands and SuDS features to ensure sufficient water is available for reuse purpose throughout the year. The extra ground infiltration from the proposed SuDS in higher parts of the proposed Development may generally enhance the baseflows in the local watercourses and proposed wetlands in the lower parts of the Site, supporting more abstraction from the current location and potential future locations. Similarly, the proposed onsite WwTW will introduce up to 44 I/s of DWF to the River East Stour, enhancing baseflows in general. Table 7 in Section 2.4 shows a summary of the Stour Abstraction Licensing Strategy, indicating water is available for licensing from surface water and groundwater sources during high flows, but no water is available to abstract during low flows and overall consumptive abstraction availability is at least 30% of the time.

In addition, for those dwellings with relatively large roof areas that are more remote from the opportunities for centralised water storage, rainwater harvesting for garden watering and toilet flushing is recommended directly from roof areas, in conjunction with an underground storage tank and a small solar pump. This would avoid any constraints on water abstraction and intercept much cleaner water, and therefore this also offers an alternative sustainable approach that can be more widely used across the development, if abstracting water from the proposed SuDS and wetlands network proves not to be feasible with the EA. It should be noted that abstractions of less than 20m³ per day are currently licence-exempt. The EA have also indicated that an abstraction licence may not be required to pump out water from offline SuDs storage facilities, but further discussion will be required to fully confirm this.



Figure 22 Disused existing metal rising main (220mm outside diameter) at the western edge of the racecourse lake

5.3.2 Effluent Reuse

Centralised wastewater effluent reuse from the onsite WwTW has not currently been pursued for the early development phases of Otterpool Park. However, it is still a potential opportunity for the later phases of the development west of A20 and Otterpool Lane because the treated wastewater and stormwater from the proposed large wetlands (W13, W15, W7 and W6) can be reused for the non-potable consumption within the development. Therefore, this opportunity can be further explored, as part of Tier 2 and Tier 3 investigations for these development phases subject to technical, financial, sustainability and social considerations.

Further technical standards and regulatory guidance on wastewater reuse options should be readily available in the UK by then to support and implement this option. A significant advantage of such wastewater effluent reuse as a water supply option is that it is largely climate independent, so is more reliable and therefore requires much reduced storage volumes. It's also possible to combine it with reuse of rainwater harvesting to maximise flood risk reduction benefits. This then even provides a potential and commercially attractive bulk water supply opportunity for the wider water consumption outside Otterpool Park in the long-term.

5.3.3 Preferred Approach

Otterpool Park is located in a water-stressed area, which require effective water efficiency and water reuse measures, as per the modified CSR Policy SS8 (with 2021 Main Modifications). Section 3.2 previously outlined the general water efficiency measures that should also be considered, in conjunction with the potential additional rainwater and wastewater reuse options discussed above. This includes water efficient fittings and appliances, water labelling, monitoring water usage, quality, and climate change impacts at all stages of the design-life of the proposed Development through smart metering. This should be combined with other smart home and office systems to give wider utility control and customer behaviours – e.g., educational and behavioural initiatives, network sensing to reduce network losses and improve efficiency, micro-controlled irrigation and smart irrigation systems. The final strategy should be devised in Tier 2 and 3 stages, by choosing a mixture of the above measures as each key development phase come forward so that the Policy SS8 requirements as well as the wider sustainability and community stewardship aspirations of Otterpool Park can be met.

5.4 Implementation and Maintenance

The integrated water management solutions (e.g. SuDS, nutrient mitigation wetlands, floodplain enhancement, rainwater harvesting) will be designed and implemented ahead of each development phase, as well as working as a wider blue-green infrastructure network across the phases once the development has been completed. This creates a localised and self-sufficient water management strategy for each phase, as well as an interconnected larger network.

Further information on the detailed design, implementation, operation and maintenance of the proposed bluegreen infrastructure for each phase will be provided as part of the Tier 2 and Tier 3 stages. A Maintenance Plan will be prepared, which should follow the recommended maintenance requirements for each of the SuDS components set out in CIRIA SuDS Manual. Opportunities to combine landscaping maintenance with SuDS maintenance should be identified to reduce the lifetime costs of the drainage system. The full details of adoption and maintenance arrangements and requirements for the proposed wetlands and SuDS will be confirmed ahead of discharging any relevant planning conditions. Section 106 money should be allocated to ensure that suitable funds for maintenance activities of the proposed SuDS, wetlands and blue-green infrastructure would be available for the lifetime of the development.

The surface water management strategy and its construction sequence will also ensure that any potential construction impacts, such as dealing with runoff from bare, compacted or muddy surfaces including haul roads associated with off-site infrastructure works are accounted for and therefore present a limited flood risk to the construction site.

The proposed Governance and Stewardship Strategy³² sets out the potential options for long-term ownership and maintenance of SuDS and recommends a 'Company Limited by Guarantee' or 'Community Interest Company' as the preferred Governance Body to ensure that those assets within the Governance Body are 'locked' and safeguarded for use in perpetuity, so any transfer of land ownership should require that specific terms and conditions are met. A Company Limited by Guarantee would be the most flexible option and would not preclude the body being converted to a Community Interest Company at a later date if that were ultimately to be a preference. Assets of a Company Limited by Guarantee could be transferred to other third-party bodies in the longer term, which could include charitable or other bodies as appropriate to the operation and management of assets. For those items which are identified as being the responsibility of the Governance Body (e.g., strategic parks and open space), long-term stewardship and governance will be undertaken by a new body established for this purpose.

In order to maintain the proposed SuDS and stormwater wetland features (including associated engineering structures), they will need to be adopted by a body that can maintain the different components so that they continue to function as designed. It is currently envisaged that they will be adopted by a combination of a Governance Body and STC as the New Appointment Variation company, which will also operate the onsite Wastewater Treatment Facility. However, it should be noted that Southern Water, which is the incumbent sewerage provider, can also adopt SuDS in accordance with the Design Construction Guidance published in 2020. Kent County Council may also retain adoption of certain SuDS features within the adopted highways subject to further detailed discussion.

The onsite WwTW (including the associated wastewater tertiary treatment wetlands system) will be operated and maintained by STC in perpetuity under the legal and regulatory provisions of the Water Industry Act, while ensuring water quality standards and nutrient mitigation to satisfy Water Framework Directive and Habitat Directive requirements. All proposed centralised rainwater and wastewater recycling measures will also be adopted and maintained by STC

³² Governance and Stewardship Strategy (ES Appendix 4.13)

Habitat creation and ecology mitigation, including addressing any potential conflicts between accessibility, safety, ecology and water management should be carefully considered and resolved, as part of the design development process of the nutrient mitigation wetlands and stormwater SuDS. For example, Wastewater Wetland W13 and the surrounding area is within the mitigation area designated for water voles and reptiles (including a presence of a public footpath), which needs consideration in preparing the design and maintenance plans.

Plants have an important role in wetland systems, which can directly affect the wastewater quality by improving various removal processes and consumption of phosphorous, nitrogen, and other elements 33. Various studies have concluded that plants along the wetland system can lead to higher percentage of nitrogen and phosphorus being removed. One study concluded 15-80% and 24-80%34 reduction for nitrogen and phosphorus whereas another concluded 14.29%-51.89% and 10.76%-34.17%35 respectively; there is a close relationship between nutrient content and increase in phytomass; the rapid increase in phytomass during the third and fourth months corresponded with high nutrient levels.

Since plants store significant amounts of nutrient and trace elements during their growth, periodic harvesting of the above-ground plant parts is a recommended practice to remove significant amounts of nutrients (mainly during the first 5 months of growth) from the wastewater flowing into the wetlands. Wetland plant species with high phytomass productivity and a well-developed root system and ability to withstand flooding are most productive in nutrient removal. Plant harvesting in wetlands generally has a positive effect on nutrient removal such as TN, TP, COD, and BOD.

Therefore, this method could be recommended as best wetland management practice to improve and maintain nutrient removal in constructed wetlands. Maintenance should also look to achieve ~20% open water, which is recommended as optimal pollutant removal (Almuktar et al. 2018). However, it should be noted that one study on the River Ingol wetland36, where no maintenance has taken place five years after the construction, is still performing well with high levels of nutrient removal.

Potential community education and involvement exercises in promoting the biodiversity within Otterpool Park can be linked with the proposed SuDS, wetlands and blue-green infrastructure across the Site. Further discussions will be required with the design teams, LPA and STC during Tier 2 and Tier 3 stages, in respect of the detailed design of the onsite WwTW to explore how utilities infrastructure and buildings could be attractively integrated into the landscape, and what role the proposed Otterpool Park community stewardship vehicle will play in managing this area.

An example of this could be a commitment to use green roofs and green walls on key utility buildings. The early delivery of the onsite WwTW (including associated foul water pumping station in the town centre) is a good example of where a benchmark of great design could be set from the outset and adopt a design-led approach to all utility buildings and structures, to minimise the impact on the quality of the public realm. Therefore, SuDS and blue-green infrastructure have been integrated into the wider masterplan strategy, providing multi-functions and benefits

³³ Vymazal, J. (2007) Removal of nutrients in various types of constructed wetlands. Science of the Total Environment, 380, 48-65

³⁴ Greenaway, M. and Woolley, A., 2001. Changes in plant biomass and nutrient removal over 3 years in a constructed wetland in Cairns, Australia. Water Science and Technology, 44(11-12), pp.303-310. https://iwaponline.com/wst/article-abstract/44/11-12/303/7971/Changes-in-plant-biomass-and-nutrient-removal-over

³⁵ Wu, H., Zhang, J., Li, C., Fan, J. and Zou, Y., 2013. Mass balance study on phosphorus removal in constructed wetland microcosms treating polluted river water. *CLEAN–Soil, Air, Water*, *41*(9), pp.844-850.

https://onlinelibrary.wiley.com/doi/pdf/10.1002/clen.201200408?casa_token=5uNWbphEaCEAAAAA:aXq7j7oblsZESaihpAEfRD4G4Em xYoib8COihJzawswb54OjN3mJ9_iIJ3bxq_88GHc-wFWRzw8eA00m

³⁶ Cooper, R.J., Hawkins, E., Locke, J., Thomas, T. and Tosney, J., 2020. Assessing the environmental and economic efficacy of two integrated constructed wetlands at mitigating eutrophication risk from sewage effluent. *Water and Environment Journal, 34*(4), pp.669-678. https://onlinelibrary.wiley.com/doi/epdf/10.1111/wej.12605

5.5 Summary

The proposed integrated approach to managing flood risk and surface water at Otterpool Park will ensure that the development passes the Sequential Test and Sequential Approach, as per the NPPF so that the developed areas are located in the lowest areas of flood risk and flood risk is safely managed over the lifetime of the proposed Development. As explained in this WCS report and within the Otterpool Park FRA and SWDS (Arcadis, 2021¹), opportunities have been maximised to ensure multiple benefits are delivered through an integrated sustainable drainage, blue-green infrastructure and water management strategy.

Integrated water management at the Otterpool Park can also help to deliver other objectives for the development including a sense of place, green infrastructure, biodiversity, education and awareness, and water sensitive behaviour. Early consideration of water management provides the opportunity to integrate the water environment into the local context and character of the area, enriching both the natural and built environment.

Sufficient green space has been allocated within the Otterpool Park to incorporate an extensive SuDS and integrated water management solutions to manage onsite and offsite flood risk following the proposed Development. This can be implemented in a phased manner as part of the strategic infrastructure, in advance of the main development construction. The proposed Development will reduce peak flood levels in the River East Stour while that the predicted increase in overall flood volume is acceptable, during infrequent catchment-wide storms.

A high-level assessment in Section 4.7, together with integrated water management strategy presented in Section 5.1 to 5.4 confirm that WwTW and surface water discharges will not increase flow risk (either flood levels or volumes) when compared against the current baseline situation, and the development proposals can indeed reduce downstream flood risk.

As highlighted in Section 1.5, the proposed Development aims for a quality sustainable community with a sense of vitality, a distinctive local character, and a close connection with its natural environment. The Sustainability Statement¹² sets out the foundations of the integrated vision that links energy, water, transport, infrastructure, resources, waste, biodiversity, and place-making with the local aspects of community, culture, and economy.

Therefore, the development proposals show how water strategies and other site-wide strategies (e.g., green infrastructure, energy, utilities) play a key role in delivering 20% Biodiversity Net Gain, improving climate resilience and place making, and promoting sustainable and low carbon design approaches across Otterpool Park. This includes delivering a net flood risk reduction, limiting extra potable water consumption below 110 l/ p/d, and ensuring nutrient neutrality and use of green walls and roofs where feasible as well as promoting smart technologies, including exploring potential opportunity to utilise waste sewer heat or from the on-site WwTW to futureproof Otterpool Park.

6 Conclusions

The key conclusions of the updated WCS assessment are presented here. This updated WCS Report should be treated as a 'living document' with the conclusions and analysis being subject to change following further detailed investigation and consultation. It is considered that developing and implementing integrated water management solutions based on the WCS conclusions and recommendations, ensuring a reliable and sustainable long-term supply of water resources while addressing the local flood risk, water quality and wastewater provision capacity constraints is key to meeting the ambitious development aspirations of the proposed Otterpool Park. The updated WCS, and related FRA and drainage strategy provide suitable building blocks for developing integrated water management solutions with the Otterpool Park development.

This updated WCS has highlighted the key infrastructure required to serve the Otterpool Park, including SuDS, integrated blue-green infrastructure, and holistic water supply and wastewater provision aspects. While infrastructure issues would be unlikely to significantly limit the proposed Otterpool Park, large-scale upgrades and new infrastructure will be required. The identified key infrastructure phasing limitations will be addressed through the proposed Infrastructure Delivery Programme.

The need to meet nutrient neutrality strengthens the case for the preferred onsite WwTW solution as well as brings significant placemaking, flood reduction, biodiversity and sustainability benefits, which will add to value creation across Otterpool Park.

Indicative guidance from the water companies suggests the following planning and construction timeframes for wastewater infrastructure provision as a normal starting point, if the new infrastructure was to be funded from their normal 5-yearly business planning cycles:

- Network improvements up to three years;
- Significant new network, and upgraded processes capability at WwTW up to five years; and
- Construction of a new WwTW or major upgrade to existing WwTW up to ten years.

STC, as a potential NAV provider, has indicated a faster delivery timescale (less than 4 years) for a new onsite WwTW provision from the placement of order because this can be funded and delivered outside the normal Ofwat's 5-yearly regulatory business planning cycles.

Any localised network upgrades can be commenced by water companies once planning permission for the development has been approved, and the developer requisition is received. Therefore, development phasing and planned development trajectories should clearly allow for sufficient lead-in time involved in investigating, planning and constructing the required key infrastructure needs. Close consultation with the water and sewerage companies will be required (i.e., both prior to and after planning permission being granted) to ensure smooth planning, investigation and construction.

Section	Concluding Comments
Water Resources and Supply	Based on the currently known forecasts AW has confirmed there is supply capacity for the early phase(s) of Otterpool Park, of approximately 1,500 additional units over-and-above the quantum of existing growth modelled for in the latest WRMP19 forecasting. AW has some headroom at present in terms of both water resources and distribution network for the initial 1,500 homes, but significant offsite infrastructure upgrade will be required to accommodate the full development. The required reinforcement can be planned and implemented ahead of the remaining development through the normal water industry's five yearly business planning process. The routing to the point of water supply connection for Otterpool will be from the northeast.
	Additional water efficiency and reuse measures encouraging WSUD principles will be put in place to restrict the maximum amount of extra drinkable water consumed by each new household to 110 litres (or less) of extra potable water consumption per person, per day.

Section	Concluding Comments
	Overall, the capacity constraints associated with the existing WwTWs and sewerage network to accommodate increased flows from the proposed Development can be addressed, with future investment and careful planning. However, Sellindge and other existing wastewater treatment works discharging into the River Stour and surroundings are also currently being investigated by the EA and NE to understand their potential negative impacts on the downstream Stodmarsh lakes European designated sites, the report due in 2022. This will investigate potential links between the River Stour and the Stodmarsh lakes systems and then propose solutions to resolve any identified impacts.
Water and	Until the report is complete and any subsequent mitigation is in place, all new development in the impacted Stour catchment must achieve nutrient neutrality under Natural England's published guidance.
Sewerage	Therefore, Otterpool Park will be served by a dedicated onsite WwTW that will be operated by STC, including a significant amount of additional constructed wetlands (25ha) and woodland planting (35ha) to offset the estimated surplus Nitrogen and Phosphorous budget from wastewater and surface water discharges from the proposed Development, as detailed in this WCS report. The onsite WwTW will be located towards the northwest corner of the Application Site boundary (at Development Parcel HT.5), and it will be constructed and commissioned in three phases to match with the proposed development trajectory. However, there is still some flexibility to connect the later phases of the proposed Development and Otterpool Framework Masterplan Area to Sellindge WwTW that is currently operated by SW, if this alternative approach is deemed to be more beneficial than expanding the onsite WwTW. These proposals have also been discussed with NE, EA and LPA to obtain their agreement in principle.
	The major impact of the Otterpool Park on the water environment will be the variations in water quality and quantity discharged to receiving watercourses from surface water runoff and the treated effluent discharge from the associated WwTW.
Water Quality	The results of the qualitative water quality analysis indicate that the proposed Development will not lead to a Deterioration of WFD status or will compromise the achievement of WFD Good status. Tightened water quality parameters will be required, and STC and SW have confirmed the indicative discharge consent parameters previously advised by the EA are technically and economically achievable within the current limits of wastewater treatment technology. However, these indicative quality discharge permit values should be verified with the EA and updated accordingly to reflect the latest DWF figures, water quality monitoring data and proposed outfall arrangements through the normal permitting process. The surface runoff from the development will be routed through several SuDS treatment stages (including first 5mm first flush treatment and construction stage silt management measures) prior to discharging to the receiving watercourses, which will ensure no deterioration of water quality. Furthermore, the proposed constructed wetlands and woodland planting will aim to improve the downstream water quality and ensure that the water quality in Stodmarsh lakes is not compromised due to the proposed Development.
Flood Risk Management	A site-specific assessment which considered the flood risk to the proposed development from all sources has been completed. All proposed main built development areas will be located outside the high and medium risk flooding areas. An exception test was also performed as per the NPPF for the three new bridge crossings over the River East Stour and the proposed design will ensure the development is safe over the recommended 100-year minimum design life, whilst addressing climate change risk and helping to reduce offsite flood risk through additional floodplain enhancements and an integrated water management strategy. The updated WCS confirms that surface runoff and WwTW discharges will not increase downstream flood risk (i.e., in terms of both flood flows and volumes) when compared against the current baseline situation. The proposed Development (with mitigation measures) can indeed reduce downstream peak river flows for the design event in excess of 30% when compared to the baseline situation.

7 Recommendations

Water Resources and Supply

To meet the sustainability and healthy town aspirations of the Policy SS8 (with 2021 Main Modifications) rainwater harvesting and reclaimed effluent re-use is an important consideration. Therefore, targeted rainwater harvesting is encouraged as part of the integrated water management strategy (e.g., by utilising the long-term storage available at the proposed SuDS and wetland features and Racecourse Lake, together with plot level water reuse for the buildings with large roofs if necessary).

Reclaimed effluent re-use from the onsite WwTW could still be a possibility within the later phases of the proposed Development, subject to satisfactory future commercial and technical viability study outcomes.

Engagement with AW should also continue to ensure the timely implementation of 11 km long new rising main to serve the Ottterpool Park from their Paddlesworth storage reservoir, prior to constructing 1,500 homes in Phase 1development.

Wastewater and Sewerage

The viable and preferred options to serve the development with the new onsite WwTW or by connecting to the existing Sellindge WwTW should be further developed in consultation with STC (as the preferred NAV provider), SW, EA and NE, by building on the work done by this WCS.

The initial development phases should be served by the dedicated onsite WwTW, including the proposed additional constructed wetlands and woodland planting to offset surplus Nitrogen and Phosphorous from wastewater and surface water discharges from the proposed Development, in consultation with NE, EA and LPA.

The onsite WwTW should be constructed and commissioned in three phases (at Development Parcel HT.5) to match with the proposed development trajectory, while still maintaining some flexibility to connect the later phases of the proposed Development and Otterpool Framework Masterplan Area phases to the alternative Sellindge WwTW if deemed more advantageous.

Water Quality

The detailed WCS should confirm the detailed proposals for the nutrient mitigation measures along with any further downstream water quality requirements associated with the preferred onsite WwTW option, incorporating the formal discharge permit requirements for the initial temporary stage and final permanent treatment for the full development.

The EA has started planning for the third cycle of RBMPs (2021-27) and therefore should be able to present a clearer view of any further requirements to move watercourses towards Good Ecological Potential, and hence what constraints this may pose to the proposed growth.

Flood Risk and Surface Water Management

Flood risk and surface water management has been primarily covered by the proposed SuDS strategy and other fluvial mitigation measures presented in the updated Site-Specific FRA and SWDS. The scope of any further modelling and the detail design development of the proposed mitigation measures should be defined in consultation with the EA and LLFA.

This work can be undertaken as part of the proposed Detailed WCS, incorporating any further surface water and river modelling that is required to fully demonstrate and maximise downstream flood risk benefits from Otterpool Park.

Detailed Water Cycle

It is recommended that there would be a suitable planning condition stating that the Tier 2 and Tier 3 design for each key development phase should be in accordance with this WCS document.

By building on the work done as part of this updated WCS, a detailed WCS should be prepared to confirm the delivery programme for the key water and wastewater infrastructure for each key development phase (or combined phases) and inform Tier 2 and Tier 3 planning applications, which should:

- collate any ongoing/future assessments undertaken by the EA and the water companies with regards to the indicative onsite and offsite wastewater discharge consenting requirements included in this updated WCS;
- coordinate the design development for the preferred onsite WwTW (for the initial development phases) and alternative existing Sellindge WwTW (for the latter development phases) to deliver the proposed Development;
- confirm (by jointly working with STC and Southern Water) the scale, detail and phasing of the other required WwTW, sewerage and water supply infrastructure upgrades to accommodate the final development up to 10,000 dwellings, while protecting the water environment and giving specific attention for the sewerage upgrade requirements associated with the early development phases;
- provide bespoke calculations to show that the nutrient removal values of the proposed wetlands can be achieved on site, in order to clearly demonstrate how nutrient neutrality will be achieved at Otterpool Park;
- identify how any infrastructure constraints can be overcome, the further action required to achieve this, and which of the stakeholders will be responsible for these actions;
- assess the applicability of the 'smart' technology opportunities to enable scalable, robust and long-term sustainable water management within the development. The WCS should also link to the emerging energy strategy (ES Appendix 4.9);
- develop a detailed surface water management strategy (in conjunction with any updated hydraulic modelling of the River East Stour, Racecourse Drain and Racecourse Lake), to effectively manage onsite flood risk while maximising downstream benefits from a range of potential integrated and attractive SuDS, WSUD and other Natural Flood Management measures at Otterpool Park;
- provide additional details of maintenance requirements associated with the proposed SuDS and nutrient mitigation wetlands, including how this will be legally secured;
- work with key stakeholders to determine the extent and most sustainable delivery options (including adoption and maintenance) for the proposed integrated water management solutions; and
- inform the WCS stakeholders of the indicative costs of the required water infrastructure and provide advice on financial contributions required from the developer to fund strategic infrastructure improvements.

APPENDIX A

Development Buildout Trajectory

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Infrastructure	GI Habitat				169.53	169.53			5.72	4	2.34	3 2.3	7	0.81	2.78	2.934			2.73	2.08	2.	42 2.67	1.17 0	.8 2.25	1.99	0.72 3.6	5 24.2	3.8 1.	5 3.84	5.69 4	26.	6 20.66	6 20.67	1.5	17		4	1 1.06	
	GI sports playing fields					11.53			0	1.62		1.2		0	0.74	0				0.74		0 0.74		0			8 0			0		19		0		2	1.8		
	GI general amenity GI playspace				38.92 6.00	38.92 6.00			3.4 0.56	1.86 0.23		1.0	7	1.35 0.2	0 0.15	0			1.56			15 2.34 02 0.35		.63 1.66 .39 0.37		0.8		0.8 1.		1.53 0.6 0.23 0.17		1 1.91 5 0.35		1.72		74	1.8 1 0.5		
	GI Strategic parks					15.71				6.48		0.5		0.34	0	0						04 0.58		.66				0.48		0.38 0.27		1.16		1.41		.1		1.02	
	GI allotments orchards GI cemetries				9.75 3.00				0.43			0.2	1	0	1.6	0				0.9		0 0	0.	.26		2.7	7 0			0.15		2			1	.5		0.41	
	GI mixed use suds					7.20				0.46		0.4	0.4		1.04	0	0.	.34		0.3	0.22	0 0.04	0.35	0.17	0.17	0.3	0	0.09 0.:	5 0.28	0.46	0.3	5		0.18	3 0.3 0	.3 0.3	0.3 0.3	0.29	
	GI housing Suds					40.76			1.45 1.1	.8 1	0.7666	0.41 0.74	66	1.21	0.79	0.64	0.747		1.39	1.5	1.5 0.	22 3.08	0.44 0	.9 1.02	1.25	0.91	0.6	1.37 1.	5 0.9		2.4	7 2.53	3 2.533	1.5		39	1.25 1.3	5 1.25	1.29
	GI secondary school playi GI primary school playing					9.78 8.14			1.3					0	6 0.82	0					1.3	0 0			1.3		0			0 1.3	1.	2		3.78		2		1.3	
	or primary school playing	neida				320.32			1.5					U	0.01	0					1.5	0			1.5		0			1.5	-			0.01				1.5	
ructure	Roads				20.33	20.33			2.94	1	0.831		1.14	0.224	0.44	3.887				1.2		1.048			0.5	0.77	7 <mark>9</mark> 0	1.3	48	1.41	0.7	6 0.76	3 0.763		0.	69	1	1 1	
	Parking Utilities				0.83				0.33				0.15										0.5									0.15	_						
	WW-T					0.45			0.15			0.8																				0.15							
ructure	Total				21.1562	22.458																																	
s assumed ear s assumed oth ercial space as s follow broad Hall only requ	ons based on a mix of tenure typ ty as existing market for tourist ter than coffee/corner shop to r isume requires a level of on site housing numbers and likely im irred when reasonably through c east one main facility and perha	and busines equire som developme pact on sch levelopmer	s travel give e developme nt to have h ool age numl t as seconda	n excellent ent to have appened b bers ery school o	transport o taken place efore enqu opened earl	connections e before en iiries to buil ier with fac	s (M20 A20) quires grow i Id will comme ilities	n town cer ence					hedule for si	ale																									
eries will follow	housing numbers will also integrate with school ar								o integrate v	vith commu	nity art plan	ıs in existing	outbuilding	g in racecou	rse)																								

APPENDIX B

Stakeholder Consultation Summary

Date	Description	Details
21/06/2017	Consultation meeting with KCC	Discussed Surface Water Strategy with LLFA
14/09/2017	Pre-Planning Application Meeting – representations from SW, AW, EA, KCC, NE & F&HDC	Workshop on Blue and Green Infrastructure Strategies
08/12/2017	Consultation meeting with AW, including representation from F&HDC and KCC	Consultation on water resources and supply issues
13/12/2017	Pre-Planning Application Meeting – F&HDC & KCC	Presentations from Py Terra and AWL regarding potential innovative water solutions
15/03/2018	Pre-Planning Application Meeting – representations from F&HDC and KCC	Discussion on WCS scope clarification and progress update
23/04/2018	Place Panel Workshop - incl. representations from EA, KCC & F&HDC	Workshop on Blue and Green Infrastructure
10/05/2018	Consultation Meeting AWL	Consultation on onsite WwTW
16/05/2018	Consultation meeting with SW, including representation from F&HDC	Consultation on offsite WwTW options
17/05/2018	Pre-Planning Application Meeting – representations from F&HDC and KCC	Consultation and progress update on infrastructure and utility strategies (including potable water & wastewater)
18/06/2018	Consultation meeting with SW, including representation from F&HDC	Consultation on offsite WwTW options
19 & 20 /06/2018	Community Engagement Events	Several wider community engagement events on Otterpool Park proposals
26/06/2018	Site Visit to Albion Water WwTW plant at Oaklands Hamlet Development near Chigwell	Site visit and presentation from AWL regarding onsite WwTW plant example at this residential development
09/08/2018	Pre-Planning Application Meeting – representations from KCC and F&HDC	Discussion with KCC (water resources team and LLFA) regarding draft WCS &

Date	Description	Details								
		FRA Report findings and key feedback comments								
15/08/2018	Consultation meeting with SW, including representation from F&HDC	Consultation on offsite WwTW and sewerage options								
20/08/2018	Consultation meeting with KCC, EA and F&HDC	Discussion with KCC (water resources team and LLFA) and EA to finalise FRA & SW drainage strategy								
21/08/2018	Consultation meeting with SW	Consultation with SW design lead to update and discuss Otterpool onsite sewerage options								
18/10/2018	Consultation with Ashford Water Group	Presentation and discussion on Otterpool Park water management strategy and mitigation of cross border issues								
10/01/2019	Consultation meeting with SW	Consultation with SW design team to discuss the initial findings of SW's Otterpool Growth Impact Study regarding existing network and WwTW constraints and solutions.								
29/05/2020	Flood Risk and Water Management Workshop	Workshop with F&HDC and KCC (LLFA) to discuss and agree the scope for updates to the WCS and FRA&SWDS for Tier 1 Planning Application								
27/02/2020	Water Strategy Scoping Workshop	Workshop with FHDC and KCC to discuss and agree the scope for updating WCS and FRA&SWDS for the new Tier 1 Planning Application								
29/05/2020	Flood Risk and Water Management - Technical Workshop 1	Workshop with F&HDC, EA and KCC (LLFA/ Water resources) to update progress and discuss discharge permitting, flood risk modelling and key elements of the WCS and FRA&SWDS updates for Tier 1 Planning Application.								
29/06/2020	Nutrient Neutrality Roundtable meeting	Roundtable meeting with NE and F&HDC (including their HRA consultants) to discuss Nutrient Neutrality assessment needs to overcome NE's Stodmarsh Lake concerns								

Date	Description	Details							
14/10/2020	Flood Risk and Water Management Workshop – Technical Workshop 2	Workshop with F&HDC, EA, NE and KCC (LLFA/ water resources) to discuss baseline hydraulic modelling, nutrient neutrality mitigation strategy, River East Stour bridge crossings design approach and integrated water management.							
31/03/2021	Cross boundary nutrient neutrality mitigation opportunity discussion	Meeting with ABC to discuss if Otterpool Park can help offering nutrient neutrality mitigation credits to deliver development sites in Ashford.							

Note – Several monthly liaison meetings with the water companies (Southern Water, Affinity Water, Albion Water and STC) have also been held in 2020 -2021 period, which are not listed in the above table.

APPENDIX C

Statement of Common Ground Between NE and F&HDC

Statement of Common Ground

Folkestone & Hythe District Council and Natural England

1. Overview

- 1.1 This Statement of Common Ground (SCG) has been prepared by Folkestone & Hythe District Council (FHDC) together with Natural England (NE). It reflects the agreed position between the parties.
- 1.2 The purpose of this SCG is to document the cross-boundary matters being addressed and progress in cooperating to address them. It is the means by which the signatory authorities can demonstrate that their plans are based on effective and ongoing cooperation and that they have sought to produce strategies that as far as possible are based on agreements with other authorities.
- 1.3 Under section 33A of the Planning and Compulsory Purchase Act 2004 (amended by section 110 of the Localism Act 2011) and in accordance with the National Planning Policy Framework (NPPF) 2019 it is a requirement under the Duty to Cooperate for local planning authorities, county councils and other named bodies to engage constructively, actively and on an ongoing basis in the preparation of development plan documents and other local development documents. This is a test that local authorities need to satisfy at the Local Plan examination stage and is an additional requirement to the test of soundness.
- 1.4 The Duty to Cooperate applies to strategic planning issues of cross boundary significance. Local authorities all have common strategic issues and, as set out in the National Planning Practice Guidance (NPPG):

"local planning authorities should make every effort to secure the necessary cooperation on strategic cross boundary matters before they submit their plans for examination."

- 1.5 The statutory requirements of the Duty to Cooperate are not a choice but a legal obligation. Whilst the obligation is not a duty to agree, cooperation should produce effective and deliverable policies on strategic cross boundary matters in accordance with the government policy in the NPPF, and practice guidance in the NPPG.
- 1.6 FHDC went out to a very limited public consultation on a revision to the Regulation 19 Core Strategy in November/December 2019 to bring it 'in check' with the Government's published figures on housing requirement.

1.7 NE responded to the Regulation 19 Core Strategy Review – submission version dated 11th March 2019, and the response is set out in Appendix A. In summary, within NE's response it is contended that:

"... the CSR can be further improved particularly with regard to the garden settlement (Otterpool Park) policies (SS6-9), especially in relation to the Kent Downs Area of Outstanding Natural Beauty (AONB), as well as general policy for green infrastructure (GI) and biodiversity net gain in policy CSD4."

1.8 This SCG deals solely with the issue of nutrient neutrality. Notwithstanding this, FHDC wishes to work with NE through the examination process to address NE's concerns, while also meeting wider national policy requirements.

2.0 Strategic matters

- 2.1 The NPPF defines the topics considered to be strategic matters (para 20). Those strategic matters relevant to FHDC and the NE are explored under suitably-titled headings, and can be summarised as follows:
 - Housing
 - Nutrient Neutrality and the impact on Habitats Sites¹ (Stodmarsh)
- 2.2. The geographical relationship of FHDC in the context of Kent (upper tier authority) and neighbouring East Sussex is represented in Figure 2.1.

Figure 2.1. Geographical relationship between FHDC and Kent and East Sussex



¹ Sites covered by <u>Conservation of Habitats and Species Regulations 2017 (as amended)</u> are referred to as 'habitats sites' in the <u>National Planning Policy Framework</u> and <u>Government guidance</u> on HRA.

Housing

2.3 Government policy places much emphasis on housing delivery as a means for ensuring economic growth and addressing the current national shortage of housing. The NPPF is very clear that:

> "strategic policy-making authorities should establish a housing requirement figure for their whole area, which shows the extent to which their identified housing need (and any needs that cannot be met within neighbouring areas) can be met over the plan period."

2.4 The Government's new national formula calculated from household formation and housing affordability figures is published regularly by Office for National Statistics, and the most recently published figure for Folkestone & Hythe district currently stands at 738 new homes a year. FHDC's Regulation 19 Plan outlines a housing requirement for 13,284 new homes over plan period (to 2036/37). Meeting this target over the plan period will be provided for by development in Core Strategy Review, Places and Policies Local Plan, existing planning permissions and small sites. Accordingly FHDC is not seeking any assistance from neighbouring authorities to meet its identified housing need.

Table 2.1: Core Strategy Review 2019/20-2036/37- elements of housing supply

Source of housing supply	Number of homes
Current planning permissions and sites under construction (with adjustment for lapsed permissions)	4,274
Places and Policies Local Plan and 2013 Core Strategy sites without planning permission	1,703
Windfall allowance (95 homes a year over 15 years)	1,425
New garden settlement (Core Strategy Review policies SS6-SS9)	5,925
Expansion of Sellindge (Core Strategy Review policy CSD9) (part of allocation without permission)	188
Total Core Strategy Review plan period	13,515

2.5 Bringing together the different sources of housing supply outlined above creates the anticipated supply of housing over the Core Strategy Review plan period. This is outlined in Table 2.1. This gives an anticipated housing supply of 13,515 homes over the Core Strategy plan period, exceeding the national minimum requirement of 13,284 homes by around 230 homes and, as a result, the district's housing need requirement can be met in full.

Nutrient neutrality and implications on the Stodmarsh designated site

2.6 As set out Annex 1 of NE's detailed advice dated 15th October 2020:

"The Stodmarsh Nutrient Neutral methodology (NNM) we have proposed is one way for competent authorities to satisfy themselves that an adverse effect upon integrity of nutrient impacts of proposals can be avoided with sufficient certainty to meet the HRA tests. An appropriate assessment should be produced for the local plan, or as an additional section in the existing local plan appropriate assessment. Natural England is a statutory consultee with regards to appropriate assessments under the Conservation of Habitats and Species Regulations (2017) as amended. We advise the appropriate assessment should include information on any likely significant effects the planned development could have and how to mitigate those to avoid an adverse effect upon the integrity of any relevant European sites. It is likely the information contained within the above documents (subject to the additional information and changes recommended in this letter) will form an important part of any appropriate assessment/ amendment to the existing local plan appropriate assessment."

- 2.7 NE have advised in respect to the nutrient calculation that the following information is included within the updated Appropriate Assessment:
 - All the information, values and assumptions made in the nutrient calculations.
 - Information and evidence to support assumptions used, especially where these deviate from Natural England's methodological advice (e.g. the Council's evidence on occupancy rates and their long term stability).
 - Evidence to support any mitigation planned, including source evidence or link if a website or copies of documents are not readily or freely available.
 - Evidence of types of mitigation (wetlands, proposals) including proposed locations to ensure the areas of mitigation are draining relevant areas of mitigation land/ WwTW so will function effectively.
 - Any additional hydraulic loading or nutrient loading calculations undertaken for wetlands or bespoke mitigation.
 - Clarification of how long term management of any mitigation land in particular wetland and other types of SUDS will be secured.
 - Maps, locations, or identification of how any mitigation that is not within the developer's ownership will be secured. In particular, information on mitigation proposals for the allocations other than Otterpool.
 - Any information on winter maintenance programmes or other information material to water quality assessment that may impact the efficacy of proposed nutrient removal systems.

Chronology of progress made with Natural England in respect of Nutrient Neutrality

- 2.8 The below chronology charts progress that has been made by the promoters of the Otterpool Park Garden Settlement, FHDC and NE regarding concerns raised by NE in relation to the excessive nutrient levels (nitrogen and phosphorous) which are impacting on the Stodmarsh Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site and the impact of the Core Strategy Review and in particular the proposed New Garden Settlement.
 - Regulation 19 response was issued by NE to the District Council dated 11th March 2019, and a copy is provided in Appendix A. The Regulation 19 response raised no issue in relation to the matter of nutrient neutrality regarding Stodmarsh designated sites
 - The Submission Version of the Core Strategy Review was formally submitted to the Planning Inspectorate on 10th March 2020 for its Examination in Public
 - Letter dated 21st May 2020 from Natural England to the District Council titled 'Conservation of Habitats and Species Regulations 2017 as amended - Folkestone & Hythe DC Core Strategy Review Examination and Otterpool Park – nutrient neutrality re Stodmarsh designated sites. A copy of this correspondence is provided in Appendix B
 - The District Council formally engaged NE under its Discretionary Advice Service (Charged Advice) dated 18 June 2020.
 - The District Council sought technical support from water quality consultants and appointed Urban Edge Environmental Consulting on 9th July 2020. A Technical Note was issued by Urban Edge Environmental Consulting (dated August 2020) that was shared with NE for their review/comment. A copy of the Technical Note is provided in Appendix C. This was supplemented by an updated Nutrient Budget spreadsheet dated 21st September 2020
 - NE re-issued advice for development proposals with the potential to increase nutrient impacts to nationally and internationally important wildlife sites within the Stour Valley catchment to all Local Planning Authorities to which the advice refers by letter dated 10th July 2020. A copy of the letter is enclosed in Appendix D. This advice clarified the wastewater treatment works to which the advice applied.
 - Advice on Nutrient Neutrality for New Development in the Stour Catchment in Relation to Stodmarsh Designated Sites - For Local Planning Authorities (dated July 2020) and updated again in November 2020. This replaced guidance issued in December 2019. A copy of the November advice is provided in Appendix E

- Officers of the District Council first shared technical reporting with Natural England (by email) on 9th September 2020. There was followup correspondence from F&HDC to seek feedback from NE
- Technical information was circulated separately by consultants Arcadis, working on behalf of the promoters of Otterpool Park, to NE on 1st October 2020 (referenced as 'Otterpool updated memo') to summarise the work undertaken on behalf of the promoter side to achieve Nutrient Neutrality at Otterpool Park. A copy of the Technical Memo is enclosed in Appendix F
- A workshop session was hosted by Arcadis on 14th October 2020, and one agenda item was the issue of Nutrient Neutrality. Both NE and officers of F&HDC were in attendance
- NE issued a formal response on 15th October 2020 in accordance with the scope of the Discretionary Advice Service dated 18th June 2020 to provide advice to F&HDC concerning housing proposals and allocations for their local plan specifically with respect to issues around nutrient neutrality. A copy of the letter is enclosed in Appendix G
- A teleconference call with NE was held on Tuesday 20th October 2020 to talk through the advice issued on 15th October 2020
- of NE joined a teleconference hosted by (on behalf of the District Council) with attendance by officers of the District Council on 28th October 2020, following discussions with officers on the 26th and 27th October
- NE have provided further written advice to the District Council dated 29th October 2020 (Appendix H refers) to advise that "Folkestone and Hythe District Council have reported significant progress to Natural England following our advice, reporting the aim to ensure safeguards are set out through policy Amendments which will be tabled at the examination."
- Arcadis issued an updated Technical Note and associated Technical Appendices to NE on 4th November 2020. A copy of the updated Technical Note is enclosed as Appendix I.
- F&HDC issued a revised version of policy CSD5 to NE for their review/comment on 5th November 2020. A copy of the revised policy is enclosed as Appendix J. F&HDC instructed its Sustainability Appraisal consultants to undertake a new Habitats Regulations Assessment based on advice received from NE
- NE responded to the draft revision to policy CSD5 on 19th November 2020. A copy of the correspondence is provided as Appendix K.
- On 2nd December 2020 NE provided a response to the updated Technical Note issued by Arcadis on 4th November. A copy of the response is enclosed as Appendix L.
- 2.9 Within the response from NE dated 2nd December 2020 it is advised that the calculations and mitigation proposals supporting documents provided above are likely to meet the HRA tests for water quality at the plan level.

3. Actions going forward

Key issue	Agreed action
Nutrient neutrality and implications on the Stodmarsh designated site	FHDC and NE to continue to liaise and work together on this matter going forward, including planning applications

4 Governance arrangements

- 4.1 The NPPG outlines that the SCG should include governance arrangements for the cooperation process, along with a statement of how it will be maintained and kept up-to-date.
- 4.2 Officers of FHDC have met virtually with representatives of the NE to discuss cross boundary strategic matters under the Duty to Cooperate. The narrative and outcome of these discussions is demonstrated in this SCG.
- 4.3 It is intended that the SCG will be updated going forward, particularly as FHDC progresses its Core Strategy Review. The SCG will then be kept under ongoing review and will be updated at key stages in FHDC plan making process and/or when new key strategic issues arise which require amendments to this SCG. If there are any changes of the content of the SCG these matters can be discussed at future Duty to Co-operate meetings.
- 4.4 It is confirmed by both signatory parties that agreement has been reached on all cross boundary issues referenced within this SCG, specifically nutrient neutrality and implications on the Stodmarsh designated site. Importantly, NE are satisfied with the policy wording following a revision to policy CSD5 (as set out in Appendix K).
- 4.5 Evidently, discussion of strategic matters under the Duty to Cooperate is an officer-led exercise. The process for reaching agreement and sign-off of SCG includes signatories from both FHDC and NE, as declared under section 5 of this SCG.

5 Signatories/declaration

Signed on behalf of Folkestone Hythe District Council (Officer)	&	Signed on	behalf of Natural England

Position: Specialist	Strategy	&	Policy	Senior	Position: Area Kent	Manager	Sussex	and
Date: 03/12	/2020				Date: 03/12/202	20		

Appendices

- Appendix_A_Natural_England_CSR_Reg_19_Representation
- Appendix_B_Folkestone_and_Hythe_DC_Natural_England_advice_nutrient_neutrality_Stodmarsh_May_2020_final
- Appendix_C_F&H_Nutrient_Budget_Technical_Note_200824_DRAFT
- Appendix_D_Natural_England's_advice letter_to_Authorities_within_the_Stour_Valley_Catchment
- Appendix_E_Stodmarsh_Nutrient_Neutral_Methodology_November_2020
- Appendix_F_Otterpool_Nutrient_Mitigation_Analysis_Update_Memo_P1
- Appendix_G_201012_UDS_Folkestone_and_Hythe_Nutrients_NE_response_to_queries_FINAL_151020
- Appendix_H_Natural_England_letter_291020
- Appendix_I_Otterpool_Nutrient_Mitigation_Analysis_Update_Memo_November_P2
- Appendix_J_2020_11_01_Policy_CSD5_Proposed_Modifications
- Appendix_K_Folkstone_Proposed_amended_wording_for_Policy_CSD5_f_NE_191120
- Appendix_L_Otterpool_updated_technical_note_and_NN_calculation_NE_response

APPENDIX D

Nutrient Neutrality Assessment – For Onsite WwTW

The relevant excel calculations printouts associated with Nutrient Neutrality Assessment are given for the Onsite WwTW proposal for the following scenarios:

- 1. Combined Nutrient WwTW and Land Use Loading
- 2. WwTW Nutrient Loading Only
- 3. Land Use Nutrient Loading Only

For the Scenario 1, calculations (including preliminary hydraulic loading calculations for the proposed mitigation wetland areas) are provided for:

- Otterpool Framework Masterplan Area (OFMA)
- OFMA and Sellindge Phase 2 Sites Combined

Sensitivity testing are also given to account for the 61ha of additional open space areas in urban development parcels (i.e., those additional Public Open Space currently not shown in Tier 1 Parameter Plans to facilitate more flexibility in masterplanning in Tier 2 and Tier 3 stages)

For the Scenario 2 and 3, further calculations are provided for:

- Otterpool Tier 1 Application
- Otterpool Framework Masterplan Area (OFMA)
- OFMA and Sellindge Phase 2 Sites Combined

Common datasheets (e.g. existing land use type measurement information – worksheets 5 & 6, wetland hydraulic loading calculations – worksheet 8) are generally not repeated unless some information is different.

Onsite WwTW

Scenario 1 - Combined Land Use and WwTW Discharges Loading

1A - Otterpool NN (V1.8) - Onsite WwTW – OFMA.xlsx

1. Input Data

Guidance Not Used in this Calcs as onsite WwTW is used instead

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC		
	Otterpool Park Garden Town -		
Development name	Masterplan Framework Only		
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/	
Number of residential dwellings (Class C3)	8704		
Number of residential dwellings (Class C2)	1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
	-		
	Figures	Units	Data source
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water
o	e e	mg/l	Southern Water
Sewage treatment works that development drains to (if known) Total Nitrogen existing consent for this treatment works, if any, (if Known)	e e		Southern Water Southern Water - annual mean
o	e e		
	N/A		Southern Water - annual mean
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Southern Water - annual mean currently consented Total

Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Not available at present from the Environment Agency Environment Agency - this is indicative annual mean Total Phosphorous value for the	
Total Phosphorous proposed consent for this treatment works, if any, (if Know Total area of site		mg/l hectares	proposed consent to accommodate Otterpool See Proposed Land Use Tab	Not Used in this Calcs as onsite WwTW is used instead Otterpool Park FMP Only
New Urban Area	350.5	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of designated Suitable Alternative Natural Space (SANG)/open space	183.60	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab Based on the habitat survey info presented in the previous OP Outline Planning Application in 2019, consultations with FHDC & Land Agents etc. See Existing	Otterpool Park FMP Only
Current land use nitrate loss from current site land use	A mixture of arable land, improved grassland & species poor semi- improved grassland (see the breakdown in Table 1 below See Table 1 below		Land Type Tab	

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	5
Lowland Grazing Livestock	119.1	12.2	0.24	1
Racetrack	13.5	13.3		Average of urban & lowland grazing livestock loss rates used.
Hay Cut	18.9	5	0.14	1
Other Grassland/Greenfield	101.1	5	0.14	1
Mixed area - Urban	11.5	14.3	0.83	3
Mixed area - Greenfield	4.5	5	0.14	1
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	3
	613.4			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate			
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)		
CSD9B (Cereals)		27.3	0.36		
CSD9B (Urban)		14.3	0.83		
CSD9B (Other Grassland/greenfield)		5	0.14		
CSD9A (Urban)		14.3	0.83		
CSD9A (Other Grassland/greenfield)		5	0.14		
	0.00				

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

2. Otterpool FM@110(S1)

Entimeted Notes

Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development	Framework Only		
Number of residential dwellings (Class C3)	8704		
Number of residential dwellings (Class C2)	1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population	riguies	Units/ Data source	r under miternation
Occupancy rate		Natural England recommendation	
Step 2 confirm water use (litres per person)		I/p/d Natural England recommendation - for resinential Class C1	
		l/p/d British Water recommendation - for residential Class C2	No allowance included for Otterpool water efficiency measures
	300	l/p/d British Water recommendation - for Hotel Class C1	No allowance include for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW) and permitted TN concentration	Onsite WwTW	NAV	N/A - This calculation is alternative for onsite WwTW option. N/A - This calculation is alternative for onsite WwTW option.
and permitted IN concentration Permitted Total Phosphate concentration	N/A N/A		N/A - This calculation is alternative for onsite WwTW option. N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate	N/A		INA - This calculation is alternative for brisite www.rw.option.
Otterpool	72	mg/I Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool	0.1	mg/I Severn Trent Connect	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.1		
exit the WwTW after treatment			
Additional population (Residential Class C3)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)		Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development Receiving WwTW environmental permit for TN	3456696	litres/day mg/I TN	ST Connect's UCAS certified TN value
Receiving WWTW environmental permit for TP	1.2	mg/iTP	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit	6.48	mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit	0.09	ma/I TP	
TN discharged after WwTW treatment	22399390.08	mg/TN/day	
TP discharged after WwTW treatment Annual wastewater total nitrogen load	311102.64	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	8175.78	kg/TN/yr kg/TP/yr	
Annual wastewater total prosphorous load	113.55	Ng/TP/yi	
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland		
	Grazing Livestock), Hay Cut, Mixed and Other		
	Grassland (see the breakdown in Table 2 below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey info		
	presented in the previous OP Outline Planning		
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B		
Nitrate loss from current site land use			
	See Table 2A/2B	kgN/ha/yr	
	See Table 2AV2D	kgN/ha/yr	
Phosphate loss from current site land use			
Total nitrate loss from current land use	See Table 2A/2B 11573.19	knP/ha/yr KnN/vr	See Table 24/28
Phosphate loss from current site land use Total initrate loss from current land use Total Phosphate loss from current land use		knP/ha/yr KnN/vr	See Table 24/28 See Table 24/28
Total nitrate loss from current land use Total Phosphate loss from current land use	See Table 2A/2B 11573.19 196.26	knPiha/yr KnPiha/yr KgPlyr	See Table 2A/2B
Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3	See Table 2A/2B 11573.19 196.26 Figures	n Pihalyr IkgWyr KgPlyr units' Data source	See Table 2A/2B Further information
Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 2A/2B 11573.19 196.26 Figures 350.5	knP/ha/yr kgP/yr kgP/yr hoctares/site layout	See Table 2A/2B
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area notschate load	See Table 2A/2B 11573.19 196.26 Figures 350.5 14.3.	knPihalyr Igylyr Igylyr Lgylyr hectaresisile layout KgNladyr	See Table 2A/2B Further information
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 2A/2B 11573.19 196.26 Figures 350.5 14.3.	knP/ha/yr kgP/yr kgP/yr ectares/sile layout kgNha/yr kgPha/yr	See Table 2A/2B Further information
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area notschate load	See Table 2A/2B 11573.19 196.26 Figures 350.5 143.3 0.83	knP/ha/yr kgP/yr kgP/yr ectares/sile layout kgNha/yr kgPha/yr	See Table 2A/2B Further information
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area notschate load	See Table 2A/2B 11573.19 196.26 Figures 350.5 143.3 0.83	knP/ha/yr kgP/yr kgP/yr ectares/sile layout kgNha/yr kgPha/yr	See Table 2A/2B Further information
Total ritrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area	See Table 2A/2B 11573.19 196.26 Figures 3450.5 083 083 5012.15	soPhayr KoPlyr KgPlyr Inclarestsile layout KgNhayr KgPlhayr KgNyr	See Table 2A/2B Further information
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area notschate load	See Table 2A/2B 11573.19 196.26 Figures 350.5 143.3 0.83	soPhayr KoPlyr KgPlyr Inclarestsile layout KgNhayr KgPlhayr KgNyr	See Table 2A/2B Further information See Proposed Land Use Tab
Total initiale loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/come soace	See Table 2A/2B 11573.19 196.26 Figures 350.5 14.3 0.83 5012.15 280.92 185.6	knP/ha/yr kgP/yr kgP/yr hectaresfalle layout kgNha/yr kgNha/yr kgNyr kgP/yr ha	See Table 2A/2B Further information See Proposed Land Use Tab
Total intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space	See Table 2A/2B 11573.19 196.25 6 14.3 5012.15 5012.15 220.92 1838 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	In Phay'r IapNyr IgPyr Iachresiate layout Agellay'r Ighlayr IgNyr IgPlyr	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed militgation areas (i.e. Wetland & Woodland areas). See Input
Total initial loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area initigen load Urban area initigen load Urban area initigen load Nitrogen load from future urban area Phosphorous load from future urban area New SANGloppen space SANGloppen space phosphorous load	See Table 2A/2B 11573.19 196.25 6 14.3 5012.15 5012.15 220.92 1838 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	In Phay'r IapNyr IgPyr Iachresiate layout Agellay'r Ighlayr IgNyr IgPlyr	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed militgation areas (i.e. Wetland & Woodland areas). See Input
Total intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitrogen load SANGlopen space	See Table 24/28 11573.19 195.25 74.3 083 5012.15 220.92 183.6 5 0.14 290.92 183.6 5 0.14 918 918	nP/hay/r kgPlyr kgPlyr hectaeveristie layout hectaeveristie layout kgPlyr kgPlyr kgPlyr kgPlyr kgPhyr	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed militgation areas (i.e. Wetland & Woodland areas). See Input
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Total intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitrogen load SANGlopen space nitrogen load SANGlopen space Phosphorous Load from SANGlopen space Phosphorous Load from SANGlopen space Phosphorous Load from SANGlopen space	See Table 2A/2B 11573.19 196.25 14.3,3 5012.15 200.92 183.6 0,5 0,5 0,5 0,5 0,5 0,5 0,5 0,5 0,5 0,5	In Phay r In Phay r IgPlyr units/ Data source hotaresistic layout AgNay r IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Na IgPlyr Ig	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed militgation areas (i.e. Wetland & Woodland areas). See Input
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Total initiale loss from current land use Total Phosphale loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area SANG/open space introgen load SANG/open space introgen load SANG/open space introgen load SANG/open space phosphorous load SANG/open space phosphorous load SANG/open space phosphorous load SANG/open space strongen load SANG/open space strongen load SANG/open space strongen load SANG/open space strongen space Phosphorous Load from SANG/open space New Community Farm/Aldiments area New Community Farm/Aldiments and Nitrogen Load from Community Farm/Aldiments	See Table 2A/2B 11573.19 196.26 Figures 340.3 5012.15 290.92 183.6 9 9 183.6 9 9 183.6 9 9 193 2570 9 8 2570 9.8 253.0 9 8 223.3 0.28 220.32 220.32 220.32 220.32 223.30 224.22 220.32 223.30 224.22 223.30 224.22 223.30 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 224.22 225.225.	InPihayn InPihayn IgPlyr units/ Data source Inclaresiste layout IgPlayr IgPlyr IgPlyr IgPlyr IgPlyr IgPlyr IgPlayr IgPlayr IgPlayr IgPlayr IgPlayr IgPlayr IgPlayr	See Table 2A/2B Further information See Proposed Land Use Tab Encluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
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Total rintzle loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area rintogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area SANG/open space SANG/open space rintogen load SANG/open space rintogen load New Community Farm/Allotments New Community Farm/Allotments Phosphorous load from SANCorpos load Nitrogen Load from Community Farm/Allotments New Woodland Area nitrogen load	See Table 2A/2B 11573.19 196.26 Figures 340.5 5012.15 290.92 183.6 5 0.14 918 20.92 20.92 20.92 2570 9.9 228 2570 9.9 228 2570 9.9 228 2570 9.9 228 2570 9.9 228 2570 9.9 2570 2570 2570 2570 2570 2570 2570 2570	In Pihay r KnP/inay r KgP/yr units/ Data source hoctares/site layout kg/hay'r kgP/kyr kgP/kyr kgP/kyr kgP/kyr kgP/nyr	See Table 2A/2B Further information See Proposed Land Use Tab Encluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
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Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting

or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

	Average Nutrient Loss Rate		Estimated Nutrient loss			
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)	
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00	
CSD9B (Urban)	0	14.3	0.83	0.00	0.00	
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00	
CSD9A (Urban)	0	14.3	0.83	0.00	0.00	
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00	
	0.0			0.00	0.00	
* Note that Sellindge Sites are not applicapable for this calcula	ote that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).					

Stage 1 to Stage 3 Nutrient Loading Calcs Summary						
	TN (kgN/yr)	TP (kgP/yr)				
Stage 1 - WwTW load	8175.8	113.6				
Stage 2 - existing agriculture landuse load	11573.2	196.3				
Stage 3 - proposed development landuse load	6335.5	320.1				

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	8175.8	113.6	
Step 2 (Stage 3 - Stage 2)	-5237.7	123.8	
Step 3 (Step 1 + Step 2)	2938.0	237.4	
Step 4 (= Step 3, i.e. N/P budget without buffer)	2938.0	237.4	
Step 5 (Step 4*20%)	587.6	47.5	
Step 6 (Step 4 + Step 5)	3525.7	284.8	

litrogen/Phosphorous Budget with 20% buffer

3. Otterpool FM@110(S2)

Client	Folkstone and Hythe DC		
Development	Town - Masterplan Framework Only		
Number of residential dwellings (Class C3)	8704		
Number of residential dwellings (Class C2)	1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate	2.4	Natural England recommendation	
Step 2 confirm water use (litres per person)	110	I/p/d Natural England recommendation - for resinential Class C1	
	262.5	I/p/d British Water recommendation - for residential Class C2 (adjusted to 75%) I/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures 75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW	NAV	N/A - This calculation is alternative for onsite WwTW option.
and permitted TN concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Permitted Total Phosphate concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate			ST Connect's UCAS certified TN value
Otterpool	1.2	mg/l Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to accommodate Otternool		ma/l Severn Trent Connect	ST Connect's committed TP value. Onsite WwTW permit u/s outfall option
accommodate Otterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.1	mg/l Severn Trent Connect	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
exit the WwTW after treatment			
Additional population (Residential Class C3)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)		Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development Receiving WwTW environmental permit for TN	3166986	litres/day mg/l TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP	0.1	mg/I TP	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit	6.48	mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit	0.09	mg/I TP	
TN discharged after WwTW treatment TP discharged after WwTW treatment	20522069.28	mg/TN/day mg/TP/day	
Annual wastewater total nitrogen load	285028.74	kg/TN/yr	
Annual wastewater total phosphorous load	104.04	kg/TP/yr	
Stage 2	Figures	Units/ Data source Ecology Survey report reference/remote imagery	Further information
	Cereals/Lowland Grazing	Ecology Survey report reference/remote imagery	
	Livestock), Hay Cut, Mixed and		
	Other Grassland (see the		
	breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this largely based on the habitat survey		
	info presented in the previous OP		
	Outline Planning Application in		
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
5 5			
Minute Loss from a constant official and an a	Out Table 04/02	1-810-5-	
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/yr	
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B 11573.19	knP/halyr KnN/vr	See Table 24/28
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B	knP/halyr KnN/vr	See Table 24/28 See Table 24/28
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3	See Table 2A/2B 11573.19 196.26 Figures	knP/halyr kgNyr kgP/yr units/ Data source	See Table 24/28 See Table 24/28 Further information
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Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precationary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Other Grassland/Greenfield Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss R	Average Nutrient Loss Rate		ent loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)	
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00	
CSD9B (Urban)	0	14.3	0.83	0.00	0.00	
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00	
CSD9A (Urban)	0	14.3	0.83	0.00	0.00	
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00	
	0.0			0.00	0.00	
* Note that Sollindae Sites are not applicanable for this calcula	that Sallindan Sithe are not annice matching effort nurrows (i.e. only OEMA is included)					

Stage 1 to Stage 3 Nutrient Loading Calcs Summary						
	TN (kgN/yr)	TP (kgP/yr)				
Stage 1 - WwTW load	7490.6	104.0				
Stage 2 - existing agriculture landuse load	11573.2	196.3				
Stage 3 - proposed development landuse load	6335.5	320.1				

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	7490.6	104.0	
Step 2 (Stage 3 - Stage 2)	-5237.7	123.8	
Step 3 (Step 1 + Step 2)	2252.8	227.8	
Step 4 (= Step 3, i.e. N/P budget without buffer)	2252.8	227.8	
Step 5 (Step 4*20%)	450.6	45.6	
Step 6 (Step 4 + Step 5)	2703.4	273.4	
	2703.4	273.4	

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Sce	enario 1)	PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Severn Trent Connect - onsite WwTW	3526	285	2703	

Nutrient Mitigation - Wetland Area Requirement Summary

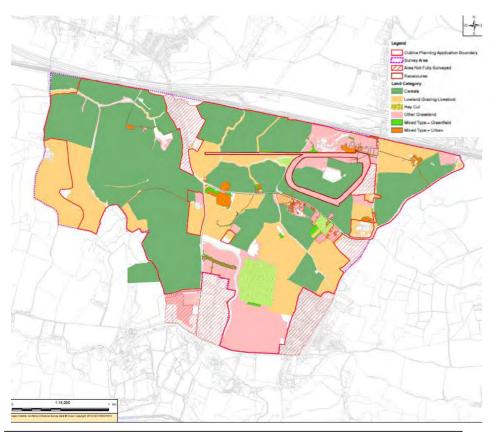
	PCC (Scenario 1)		PCC (Scenario 2)		
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (
Severn Trent Connect - onsite WwTW	3.8	23.7	2.9		

Assumed Wetland TN removal rate	93 g/m2/yr	930 kg/ha/yr
Assumed Wetland TP removal rate	1.2 g/m2/yr	12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

	273
a (ha)	

22.8



Existing Land Type Area Statement within Outline Pl	anning Application Boundary		
Land Category	Area in Mt	Area in Ha	
Cereals	3189561.4	319.0	
Lowland Grazing Livestock	1191257.8	119.1	
Racetrack	135944.9	13.6	
Hay Cut	188948.6	18.9	
Other Grassland	682491.8	68.2	Racetrack area deducted from "Other Grassland" area
Mixed Type - Urban	114712.8	11.5	
Mixed Type - Greenfield	45277.5	4.5	
	5548194.8	554.8	

Existing Land Type Area Statement Outside Outline Planning Application Bo Masterplan Where Existing Land Use Will Be Chan		n Framework		
Land Category	Area in Mt	Area in Ha		
Cereals	59053.0	5.9		
Other Grassland	328090.0	32.8		
Urban	199241.0	19.9		
	586384.0	58.6		
		Area in Ha		
Retained farmland in Framework Masterplan Area				
Existing Community in Framework Masterplan Area				
Other existing retained land within Otterpool OPA (e.g. vegetation/buildings/		16.9		

waterbodies/ecological features)	16.8
	142.7
	Area in Ha
Framework Masterplan Boundary	756.1

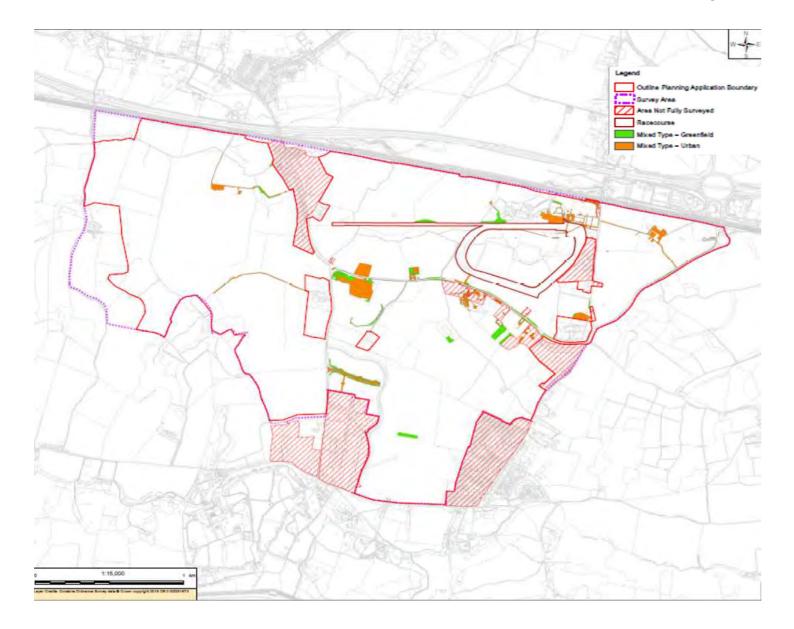
Existing Land Type Area Statement For CSD9A & CSD9B

Land Type	Area in Ha
CSD9B (Cereals)	17.16
CSD9B (Urban)	0.7
CSD9B (Other Grassland/greenfield)	1.05
CSD9A (Urban)	0.08
CSD9A (Other Grassland/greenfield)	8.98
	27.97

Note: Existing landuse data for CSD9A and CSD9B is currently taken from FHDC Stodmarsh Nutrient Budget (dated 21/09/2020) without GIS measurement although Arcadis undertaken a quick sense check by comparing with Google Areal images to validate this info.

5. Existing Land Type Data

6. Existing Mixed Land Type



Sr No	Mixed Land Bifurcation	Area In mt	Area In mt	Reclassify	
1	Bare ground	23746.05	1.00	Mixed	
2	Building	14063.76	114712.81	Type -	
3	Hardstanding	76903.00		Urban	
4	Broad-leaved semi-natural woodland	2368.32			
5	Dense/continuous scrub	10226.22		Mixed Type - Greenfield	
6	ESP	5400.94			
7	Introduced shrub	4640.75			
8	Parkland Scattered Trees	610.57	45277.52		
9	Plantation woodland	7195.03			
10	Riparian	335.52			
11	Standing water	2286.54			
12	Tall ruderal	12213.65			
	Total	159990.33	159990.33		

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A					
Sellindge CSD9B					
CSD9A & 9B TOTAL	0	0.00	0		0

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTERPOOL FRAMEWORK MASTERPLAN

	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	183.6	
Total Urban Area in Framework Masterplan	350.5	
Total OP Framework Area Check	756.1	

*Note that leachate loads from woodland is calculated separately instead of SANG leachate rates.

8. Wetland Hydraulic Loading

Wetland Details Summary

	Wetland Area				
Wetland_ID (See Note 1)	(m2)	Wetland Area (ha)	Wetland Depth (m)	Treatment depth (m)	Comments
W1	14609	1.46	0.72	0.35	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W2	9161	0.92	0.73	0.38	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W3	9365	0.94	0.45	0.04	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W4	17028	1.70	0.37	0.07	Receives storm discharge
W5	21077	2.11	0.46	0.16	Receives storm discharge
W6	26315	2.63	0.87	0.27	Receives storm discharge
W7	18736	1.87	0.54	0.24	Receives storm discharge
W8	16076	1.61	0.79	0.45	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W9	2692	0.27	0.73	0.13	Receives storm discharge. W9 & W10 are interlinked (Total area 1.1ha)
W10	7784	0.78	0.81	0.21	Receives storm discharge. W9 & W10 are interlinked (Total area 1.1 ha)
W11	5243	0.52	0.65	0.04	Receives storm discharge. W11 & W12 are interlinked (Total area 1.8 ha).
W12	12623	1.26	0.34	0.04	Receives storm discharge. W11 & W12 are interlinked (Total area 1.8 ha).
W14	11103	1.11	0.38	0.08	Receives storm discharge
					Receives wastewater discharge. The total footprint of the wetland is 13.0ha but only 75% is taken as effective area (9.75ha) due to earth works required for cascade
W13	130129	13.01	0.50	0.25	wetland features.

Preliminary Hydraulic Loading Calcs For Storm Wetlands

			First Flush Treatment Storage Check - using 15mm depth (Based on EA						
			R&D Technical Report P2-159/TR2)			Alternative Treatment Storage Check - (Based on EA Ra	Alternative Treatment Storage Check - (Based on EA R&D Technical Report P2-159/TR2)		
		Contributing	Estimated Storm				Treatment Storage	Treatment	
		Storm Drainage	Catchment	Paved First Flush Volume	Average Treatment Depth		Rq (m3/ha) - Ref	Storage Rq	Average Wetland
Storm Wetland	Contributing Drainage Zones (See Notes 2 and 3)	Zone Area (ha)	Impermeability (%)	(m3)	(m)	WWAR (%)	Figure 2.2	(m3)	Depth (m)
W1	WH1 (75%), ET1, ET2	66.76	51%	5113	0.35	2%	64	4273	0.29
W2	WH2 (80%), ETS	33.69	68%	3448	0.38	3%	76	2561	0.28
W3	WH1 (25%)	8.20	30%	363	0.04	11%	45	369	0.04
W4	RS2, RS3 & RH4	23.04	34%	1178	0.07	7%	49	1129	0.07
W5	RS1, WH3, E03 & WO2	62.45	37%	3473	0.16	3%	52	3247	0.15
W6	WO1, WO3,BH1, BH3, BH6, BH7, WO4	121.94	39%	7185	0.27	2%	53	6463	0.25
W7	BH2, BH4, BH5 & Phase 9	101.25	29%	4404	0.24	2%	44	4455	0.24
	WH2 (20%), WN1, WN2, EO4, SO6(30%), EO1 (70%), EO2, SO1, SO2								
W8	(70%), SO3, SO4, S05	131.97	36%	7185	0.45	1%	51	6730	0.42
W9	RS5 (25%)	4.87	49%	357	0.13	6%	61	297	0.11
W10	WH5, RS5 (75%)	23.02	47%	1616	0.21	3%	60	1381	0.18
W11	WH4 (30%)	4.74	29%	206	0.04	11%	44	208	0.04
W12	WH4 (70%)	11.05	29%	480	0.04	11%	44	486	0.04
W14	EO5, EO1 (30%), SO2 (30%)	21.57	27%	874	0.08	5%	43	928	0.08
				35882				32527	

Preliminary Hydraulic Loading Calcs For Wastewater Wetland (W13)

	Effective Wetland Area (m2) - See Note 4	Effective Wetland Depth (m)	Max Dry Weather Flow, DWF (m3/day)	Hydraulic Retention Time, HRT (days) - See note 5	Hydraulic Loading Rate, HRT (m/day) - See Note 5
OPTION 1 - Assuming 50mm effective treatment depth	97597	0.05	3456.70	1.4	0.04
OPTION 2 - Assuming 150mm effective treatment depth	97597	0.15	3456.70	4.2	0.04
OPTION 3 - Assuming 250mm effective treatment depth	97597	0.25	3456.70	7.1	0.04

The hydraulic residence time (HRT) was calculated as follows: Wetland volume (m²)

HRT (days) = Outflow rate (m²/day)

The hydraulic loading rate (HLR) was calculated as follow:

Infow rate (m³/day) HLR (m/day) = Wetland surface area (m²)

Hydraulic residence times and loading rates

Wetland nutrient removal efficiency is widely considered to be dependent upon both the HLR and the HRT (Dong et al., 2011). A high effluent loading rate coupled with a short residence time will typically overload the ICW, giving insufficient contact time for physical, chemical and biological removal of pollutants. For this reason, HRTs of 5-30 days and HLRs of < 0.1 m/day have been recommended (Wu et al., 2015). Shallow water depths (<50 cm) are also recommended to increase the contact time between effluent and wetland sediment, whilst also keeping water oxygenated through good contact with the atmosphere (Wu et al., 2015).

Notes

1. Proposed Wetland locations are shown on Drawing No. 10029956-AUK-XX-XX-DR--CW-0041-P3 (Proposed Nutrient Mitigation Strategy) in Appendix F.

2. Proposed Surface Water Drainage Zones are shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0007-P7 (Surface Water Drainage Zones and Runoff Rates) in Appendix J.

3. Proposed Surface Water Drainage Strategy is shown on Drawing No. 10029956-AUK-XX-XX-DR--CW-0014-P4 (Surface Water Drainage Strategy Overview) in Appendix J.

4. Total wetland area for W13 is 13.01ha but assumed 75% for effective wetland area and remaining 25% for creating bunds for cascade features (i.e. @ 1 in 20 existing ground slope). 5. The above shows that HRT of > 5 days and HLR of < 0.1 m/day can be achieved with the proposed WwTW wetland W13 (Option 3 - 250mm effective treatment depth) and therefore meets the recommended wetland design guidance.

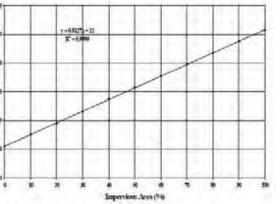


Figure 2.2 Wetland Treatment Storage Volumes

Guidance Manual for Constructed Wetlands

RAD Technical Report P2-159/TR2

J. B. Ello, R.B.E. Shores and D.M. Reytt

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Onsite WwTW

Scenario 1- Combined Land Use and WwTW Discharges Loading

1B - Otterpool NN (V1.8) - Onsite WwTW - OFMA & Sellindge.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC			
Cilent harrie	Masterplan Framework (incl			
Development name	CSD9A & CSD9B			
Development location (grid reference)		https://gridreferencefinder.com/		
Number of residential dwellings (Class C3)	9054	https://gridielerender.com/		
Number of residential dwellings (Class C3)	1296			
Hotel Bedrooms (Class C1)	1250			
Local Planning Authority	Folkstone and Hythe DC			
Local Hanning Automy				
	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instead
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known	N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
5 1 1 , , , , , , , , , , , , , , , , ,		5	Environment Agency - this is	
			indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know		mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site	784.1	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
New Urban Area	369.0	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of designated Suitable Alternative Natural Space (SANG)/open space	193.10	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
			Based on the habitat survey info	
			presented in the previous OP	
			Outline Planning Application in	
			2019, consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved			
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below	hables (a		
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	
Lowland Grazing Livestock	119.1	12.2	0.24	
Racetrack	13.5	13.3	0.0	Average of urban & lowland grazing livestock loss rates used.
Hay Cut	18.9	5	0.14	
Other Grassland/Greenfield	101.1	5	0.14	
Mixed area - Urban	11.5	14.3	0.83	
Mixed area - Greenfield	4.5	5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	
	613.4			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded	
from the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained	
farmland & 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/	
other ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
CSD9B (Cereals)	17.16	27.3	0.36	
CSD9B (Urban)	0.7	14.3	0.83	
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	
CSD9A (Urban)	0.08	14.3	0.83	
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	
	27.97			

2. Otterpool FM+CSD9A&B@110(S1)

New development nitrogen budget			
Client	Folistone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development Number of residential dwellings (Class C3)	Framework (incl CSD9A & CSD9B) 9054		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	9054 1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folistone and Hythe DC		
Stage 1	Figures	Units/ Data source	Eurther information
Step 1 calculate additional population	Figures	Units/ Data source	Further information
Occupancy rate	2.4	Natural England recommendation	
Step 2 confirm water use (litres per person)	110	Up/d Natural England recommendation - for resinential Class C1	
	350	Up/d British Water recommendation - for residential Class C2	No allowance included for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	300 Onsite WwTW	Up/d British Water recommendation - for Hotel Class C1	No allowance include for Otterpool water efficiency measures N/A - This calculation is alternative for onsite WwTW option.
and nermitted TN concentration	Onsite WWW N/A	new .	N/A - This calculation is alternative for onsite WwTW ontion
Permitted Total Phosphate concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to			
accommodate Otterpool	7.2	mgil Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.1	mgil Severn Trent Connect	ST Connect's committed TP value. Onsite WwTW permit u/s outfall option.
exit the WwTW after treatment			
Additional population (Residential Class C3)	21729.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development Receiving WwTW environmental permit for TN	3549096	litresiday mgi TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP	0.1	mai TP	ST Connect's committed TP value, Onsite WwTW permit u/s outfail option.
90% of the proposed consent TN limit	6.48	mol TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit	0.09	mgi TP	
TN discharged after WwTW treatment TP discharged after WwTW treatment	22998142.08	mg/TN/day	
Annual wastewater total nitrogen load	319418.64 8394.32	ko/TN/vr	
Annual wastewater total phosphorous load	116.59	kg/TP/yr	
Stage 2	Figures	Units/ Data source	Eurther information
ouge z	Figures	Ecology Survey report reference/remote imagery	Further information
	A mixture of arable land (i.e. Cereals/Lowland		
	Grazing Livestock), Hay Cut, Mixed and Other		
	Grassland (see the breakdown in Table 2 below and 'Land Type Overview' Tab) - this		
	largely based on the babitat survey info		
	largely based on the habitat survey info presented in the previous OP Outline		
Current land use	largely based on the habitat survey info presented in the previous OP Outline Planning Application in 2019.		Sellindoe CSD9A & CSD9B Sites included separately based on available data .
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	presented in the previous OP Outline Planning Application in 2019.	hectares	Sellindse CSD9A & CSD9B Sites included secarately based on available data . See Table 2A/2B & Input Data Tab
	presented in the previous OP Outline Planning Application in 2019.	hectares	
	presented in the previous OP Outline Planning Application in 2019.	bectares	
	presented in the previous OP Outline Planning Application in 2019.	Pectares	
	presented in the previous OP Outline Planning Application in 2019.	hectares	
	presented in the previous OP Outline Planning Application in 2019.	hectares	
	presented in the previous OP Outline Planning Application in 2019.	hectares	
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	presented in the previous OP Outline Planning Application in 2019.	hectares sightnayr	
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This nutrient budget is provided in good faith, populat best available science and expert option and adherin

best available science and expert option and adhering to the precautionary principle. Arcads accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

able 2A - Existing Land Types and Nutrient Loss Rates (Ottorpool Masterplan Framework)

		Average Nutrient Lo	ana Rate	Estimated Nutr	lent loss
Land Type	Hociarea	Nitrate - Nitrogen (kg Niha/yr)	Phosphorous (kg Pihalyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg Plyr)
Cereals	334.9	27.3	0.36	8809.77	115.96
Lowland Grazing Livestock	115.1	122	0.24	1453.02	28.58
Racetrack	135	9.2	0.535	178.85	7.22
Hay Cut	18.9	5	0.14	94.50	2.05
Other Grassland Greenfield	101.1	5	0.14	505.50	14.15
Moed area - Urban	115	143	0.63	104.45	9.55
Moed area - Greenfield	4.5		0.94	22.50	0.63
Other Grassland/Greenfeld Moed area - Urban Moed area - Greenfeld Remaining Urban Area in Framework Masterplan, CSD6A & CSD6B	19.9	143	0.63	204.57	16.52
	613.4			11573.19	196.25

able 2B - Existing Land Types and Nutrient Loss Rates (CSDSA & CSD

		Average Nutrient Lo	sx Rate	Estimated Nutri	
Land Type	Moctarea	Nitrate - Ntrogen (kg Niha/yr)	Phosphorous (kg Pihalyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg Plyr)
CSD98 (Censuls) CSD98 (Uban)	17.16	27.3	0.36	468.47	6.10
	6.7	143	0.63	10.01	0.50
CSD98 (Oher Grassland/greenfield)	1.05	5	0.94	5.25	0.15
CSD9A (Urban)	0.08	143	0.63	1.14	0.07
CSD9A (Other Grassland/greenfield)	5.90	5	0.94	44.90	1.25

Stage 1 to Stage 3 Nutrient Loading Calcs Summary					
TN (kgNyr)	TP (kgP/yr)				
8394.3	116.6				
12103.0	204.5				
6647.1	336.7				
	8394.3 12103.0				

tage 4 - Net Change in Nitrogen and Phosphorous Bud

	TN (kgNyr)	TP (kgP/yr)
Step 1 (Stage 1)	8394.3	116.6
Step 2 (Stage 3 - Stage 2)	-5455.9	132.2
Step 3 (Step 1 + Step 2)	2938.4	248.8
Step 4 (= Step 3, i.e. NP budget without buffer)	2938.4	248.8
Step 5 (Step 4*20%)	587.7	49.8
Step 6 (Step 4 + Step 5)	3526.1	298.6
	3526.1	298.6

3. Otterpool FM+CSD9A&B@110(S2)

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Names of the second sec	Development	Framework (incl CSD9A & CSD9B)		
Names of the second sec	Number of residential dwellings (Class C3)			
Use at the model of the second of t	Number of residential dwellings (Class C2)			
Tage 1 Figure 1 Under Marcan Period Period Marcan Concerving in the production of these per period Inter Marcan Marcan Inter Marcan Marcan The other Marcan Tage 2 and marcan Inter Marcan Inter Marcan Inter Marcan The other Marcan	Hotel Bedrooms (Class C1)			
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Bits 1 bottom Ones Work With 1 bottom Bits 1 botto		225	Invid British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
Product of the Property accountant on the second account of the Property accountant on the Property account of the Property accountant on the Property accountes accountant on the Property accountant on the Property	Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW	NAV	N/A - This calculation is alternative for onsite WwTW option.
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accommand integrated memory in the contract is the second part of the	Permitted Total Phosphate concentration	NA		NIA - This calculation is alternative for onsite WWTW option.
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Additional production Model, Clash C, Thomas M, Barrow M, B	Additional population (Residential Class C3)			Assumed 2.4 Occupancy Rate/per dwelling
Wateback in the interaction is also spectrated by expected interaction in the interaction of the interaction interaction is a present or with a control of the interaction is	Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per owering
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Neurodan sea (1992) Automobile topological and Use Table (1994) Automobile topological and Polycesel Land Objecesel Land	Total Phosphate loss from current land use	204.49	kgP/yr	See Table 2A/2B
New data marka Model Notes	Diama D	Finner	un bet Date annue.	Pushes Information
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Natiogen back from future urban was Strikt 201	Urban area nitrogen load	14.3	koNihalvr	
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Exclude proposed might a mark (a . Webuild & Woodard awas). See Exclude proposed might and Exclude proposed mig	Nitrogen load from future urban area	5276.27	kgNiyr	
Exclude proposed might a mark (a . Webuild & Woodard awas). See Exclude proposed might and Exclude proposed mig				
Exclude proposed might a mark (a . Webuild & Woodard awas). See Exclude proposed might and Exclude proposed mig	Phone have been failed and the second second	005.05	1-D1-	
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SMROigen papes projektoras load 0.0.0.1.0.1.0.0.0.0.0.0.0.0.0.0.0.0.0.0				Tab and Proposed Land Use Tab for details.
Natogen Load from SARDipon space 9655 lightyr Prophrona Load from MaRDipon space 2720 lightyr New Community FamilyRohmets area 88 lpa Sees Input Data Tab and Proposed Land Use Tab for details. New Community FamilyRohmets introgen bad 225 lighthyr				
Phosphrous Load from SAVAGong space 2703 kgP/yr New Community Famr/Alotnents area 98 ha See Input Data Tab and Proposed Land Use Tab for details. New Community Famr/Alotnents area 235 kg/ha/yr	SANG/open space phosphorous load	0.14	kgP/ha/yr	
New Community Farm/Molments area 9.8 ha - See Input Data Tab and Proposed Land Use Tab for details. New Community Farm/Molments introgen load 23.5 kyNhavyr	Photophonous Load from SANG/open space	965.5	koP/vr	
New Community Farm/Allotments nitrogen load 23.5 kpNha/yr	New Community Farm/Allotments area	9.8	ta .	See Input Data Tab and Proposed Land Use Tab for details.
	New Community Farm/Allotments nitrogen load	23.5	kgN/ha/yr	
New Community Farm/Allotments phosphorous load 0.28 kgP/halyr	New Community Farm/Allotments phosphorous load	0.28	kpP/ha/vr	
Ntrogen Load from Community Fami/Aldements 23.0.30 Lydyy' Phosphrose Load from New Community Fami/Aldements 2.7.4 Lyd'yr	Ntrogen Load from Community Farm/Alotments Phosphorous Load from New Community Farm/Alotmonte	230.30	xgNeyr koP/vr	
New Woodland 35 ha	New Woodland	35	ha	See Proposed Land Use Tab
New Woodland Area nitrogen load 5 kgNha/y	New Woodland Area nitrogen load	5	kgNiha/yr	
New Woodand Area phosphorous load 0.02 kgPhalyr Nitrogen Load from New Woodand 175 kgNyr	New Woodland Area phosphorous load	0.02	kgP/ha/yr	
Natrogen Load tiom New Woodand 1/9 kg/vy/ Phosphorous Load from New Woodand 0.70 kg/vy/	Phosoberous Load from New Woodahd			
Combined holpsgm load toom future land uses 6447.07 (kyllyn Combined pholpsgm load toom future land uses 338.27 (kg ²)yr	Combined nitrogen load from future land uses	6647.07	kgNiyr	
	comanes prosphorous load from lotare and uses	336.72	ner on	

Disclaimer:

This nutrient budget is provided in good faith, populated using the bast available science and expert option and adhering to the precaudionary principle. Areads accept no responsibility from of lasts or damage however incurred as a direct or infarct result of acting upon this noticegen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss R	ie .	Estimated Nutr	ent loss
Land Type	Hoctares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg Pihalyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg Plyr)
Cereals	324.9	27.3	0.36	8869.77	115.95
Lowland Grazing Livestock	1921	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Out	18.9	5	0.14	94.50	2.65
Other Grassland Greenfield Meed area - Uthan Moed area - Greenfield	901.1	5	0.14	505.50	14.15
Moed area - Urban	113	143	0.03	164.45	9.55
Moed area - Greenfield	45	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD98	193	143	0.03	204.57	16.52
	6114			11573.19	196.26

Table 28 - Existing Land Types and Nutrient Loss Rates (CSDSA & CSDSB)

		Average Nutrient Loss R	late	Estimated Nutr	ient loss
Land Type	Mectarea	Nitrate - Nitropen (kg Niha/vr)	Phosphorous (kg Piha/vr)	Nitrate - nitrogen (ko Nivr)	Phosphorous (kg Plyr)
CSD98 (Cereals)	17.16	27.3	0.36	460.47	6.10
CSD98 (Urban)	07	143	0.03	10.01	0.58
CSD98 (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.06	143	0.03	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.25
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calcs Summary					
TN (kgN/yr)	TP (kgP/yr)				
7709.1					
12103.0	204.5				
6647.1	336.7				
	7709.1 12103.0	7709.1 12103.0 204.5			

Stage 4 - Net Change in Nitrogen and Phosphorous Budg

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	7709.1	107.1	
Step 2 (Stage 3 - Stage 2)	-5455.9	132.2	
Step 3 (Step 1 + Step 2)	2253.2	239.3	
Step 4 (= Step 3, i.e. NP budget without buffer)	2253.2	239.3	
Step 5 (Step 4*20%)	450.6	47.9	
Step 6 (Step 4 + Step 5)	2703.9	287.2	
	2703.9	287.2	

ren/Phosphorous Burdnet with 20% buffer

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Sce	nario 1)	PCC (Scenario 2)		
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)	
Severn Trent Connect - onsite WwTW	3526	299	2704	287	

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Sc	enario 1)	PCC (Scenario 2)				
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)	Area (ha)		
Severn Trent Connect - onsite WwTW	3.8	3 24.9	2.9		23.9		
Assumed Wetland TN removal rate Assumed Wetland TP removal rate		93 g/m2/yr 1.2 g/m2/yr		930 kg/ha/yr 12 kg/ha/yr			
	PCC Scenario 1 Residential (Class C3) = 110	0 l/p/d	PCC Scenario 2 Residential (Class C3) = 110) l/p/d			

Resident	al (Class C3) = 110 l/p/d	
Resident	al (Class C2) = 350 l/p/d	
Hotel (Cla	ass C1) = 300 l/p/d	

Residential (Class C3) = 110 l/p/d
Residential (Class C2) = 262.5 l/p/d
Hotel (Class C1) = 225 l/p/d

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A	7.56	1.50	9.06	83%	188
Sellindge CSD9B	10.91	8.00	18.91	58%	162
CSD9A & 9B TOTAL	18.47	9.50	27.97		350

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTERPOOL FRAMEWORK MASTERPLAN

	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	183.6	
Total Urban Area in Framework Masterplan	350.5	
Total OP Framework Area Check	756.1	

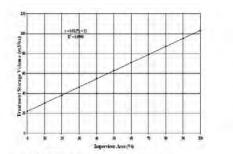
*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

8. Wetland Hydraulic Loading

Wetland Details Summary

	Wetland Area				
Wetland_ID (See Note 1)	(m2)	Wetland Area (ha)	Wetland Depth (m)	Treatment depth (m)	Comments
W1	14609	1.46	0.72	0.35	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W2	9161	0.92	0.73	0.38	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W3	9365	0.94	0.45	0.04	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W4	17028	1.70	0.37	0.07	Receives storm discharge
W5	21077	2.11	0.46	0.16	Receives storm discharge
W6	26315	2.63	0.87	0.27	Receives storm discharge
W7	18736	1.87	0.54	0.24	Receives storm discharge
W8	16076	1.61	0.79	0.45	Receives storm discharge. W1, W2, W3 & W8 are interlinked (Total area 4.9ha).
W9	2692	0.27	0.73	0.13	Receives storm discharge. W9 & W10 are interlinked (Total area 1.1ha)
W10	7784	0.78	0.81	0.21	Receives storm discharge. W9 & W10 are interlinked (Total area 1.1 ha)
W11	5243	0.52	0.65	0.04	Receives storm discharge. W11 & W12 are interlinked (Total area 1.8 ha).
W12	12623	1.26	0.34	0.04	Receives storm discharge. W11 & W12 are interlinked (Total area 1.8 ha).
W14	11103	1.11	0.38	0.08	Receives storm discharge
W13	130129	13.01	0.50	0.25	Receives wastewater discharge. The total footprint of the wetland is 13.0ha but only 75% is taken as effective area (9.75ha) due to earth works required for cascade wetland features.
•	301942	30.19			

First Eluch Treatment Storage Check, using 15mm, depth (Read on EA



Preliminary Hydraulic Loading Calcs For Storm Wetlands

Figure 2.2 Wetland Treatment Storage Volumes

AD Technical Report PD-159 TR2 J.R.Efs, R.R.F. Shies and D.M.Reyth

Guidance Manual for Co

	First Flush Treatment Storage Check - using 15mm depth (Based on EA								
			F	&D Technical Report P2-	159/TR2)	Alternative Treatment Storage Check - (Based on EA R	&D Technical Report P	2-159/TR2)	
		Contributing Storm Drainage Zone		Paved First Flush	Average Treatment Depth		Treatment Storage Rq (m3/ha) - Ref	Treatment Storage Rq	Average Wetland
Storm Wetland	Contributing Drainage Zones (See Notes 2 and 3)		Impermeability (%)		(m)	WWAR (%)	Figure 2.2	(m3)	Depth (m)
W1	WH1 (75%), ET1, ET2	66.76	51%	5113	0.35	2%	64	4273	0.29
W2	WH2 (80%), ETS	33.69	68%	3448	0.38	3%	76	2561	0.28
W3	WH1 (25%)	8.20	30%	363	0.04	11%	45	369	0.04
W4	RS2, RS3 & RH4	23.04	34%	1178	0.07	7%	49	1129	0.07
W5	RS1, WH3, E03 & WO2	62.45	37%	3473	0.16	3%	52	3247	0.15
W6	WO1, WO3, BH1, BH3, BH6, BH7, WO4	121.94	39%	7185	0.27	2%	53	6463	0.25
W7	BH2, BH4, BH5 & Phase 9	101.25	29%	4404	0.24	2%	44	4455	0.24
W8	WH2 (20%), WN1, WN2, EO4, SO6(30%), EO1 (70%), EO2, SO1, SO2 (70%), SO3, SO4, SO5	131.97	36%	7185	0.45	1%	51	6730	0.42
W9	RS5 (25%)	4.87	49%	357	0.13	6%	61	297	0.11
W10	WH5. RS5 (75%)	23.02	47%	1616	0.13	3%	60	1381	0.18
W10	WH3; (03())	4.74	29%	206	0.04	11%	44	208	0.04
W12	WH4 (70%)	11.05	29%	480	0.04	11%	44	486	0.04
W12		21.57	27%	874	0.04	5%	43		0.04
VV 14	W14 EO5.EO1(30%), SO2 (30%) 21.57 27% 874 0.08 5% 43 928 0.08 35882								

Preliminary Hydraulic Loading Calcs For Wastewater Wetland (W13)

	Effective Wetland Area (m2) - See Note 4	Effective Wetland Depth (m)	Max Dry Weather Flow, DWF (m3/day)	Hydraulic Retention Time, HRT (days) - See note 5	Hydraulic Loading Rate, HRT (m/day) - See Note 5
OPTION 1 - Assuming 50mm effective treatment depth	97597	0.05	3549.10	1.4	0.04
OPTION 2 - Assuming 150mm effective treatment depth	97597	0.15	3549.10	4.1	0.04
OPTION 3 - Assuming 250mm effective treatment depth	97597	0.25	3549.10	6.9	0.04

Notes

1. Proposed Wetland locations are shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0041-P3 (Proposed Nutrient Mitigation Strategy) in Appendix F.

2. Proposed Surface Water Drainage Zones are shown on Drawing No. 10029956-AUK-XX-XDR-CW-0007-P7 (Surface Water Drainage Zones and Runoff Rates) in Appendix J.

3. Proposed Surface Water Drainage Strategy is shown on Drawing No. 10029956-AUK-XX-XX-DR--CW-0014-P4 (Surface Water Drainage Strategy Overview) in Appendix J.

4. Total wetland area for W13 is 13.0 tha but assumed 75% for effective wetland area and remaining 25% for creating bunds for cascade features (i.e. @ 1 in 20 existing ground slope). 5. The above shows that HRT of > 5 days and HLR of < 0.1 m/day can be achieved with the proposed WwTW wetland W13 (Option 3 - 250mm effective treatment depth) and therefore meets the recommended wetland design guidance.

The hydraulic residence

Wetland volume (m²) HFT (days)= Outflow rate (m) /day)

time (HRT) was calculated as follows

The hydraulic loading rate (HLR) was calculated as Marc.

> Infowrate (m²/day) HLR(m/day)= Wetland surface area (m²)

Hydraulic residence times and loading rates

Wetland nutrient removal efficiency is widely considered to be dependent upon both the HLR and the HRT (Dong et al., 2011). A high effluent loading rate coupled with a short residence time will typically overload the ICW, giving insufficient contact time for physical, chemical and biological removal of pollutants. For this reason, HRTs of 5-30 days and HLRs of < 0.1 m/day have been recommended (Wu et al., 2015). Shallow water depths (<50 cm) are also recommended to increase the contact time between effluent and wetland sediment, whilst also keeping water oxygenated through good contact with the atmosphere (Wu et al., 2015).

https://onlinelibrary.wiley.com/doi/epdf/10.1111/wej.12605

Onsite WwTW

Scenario 1 - Combined Land Use and WwTW Discharges Loading

1C - Otterpool NN (V1.8) - Onsite WwTW-OFMA – Sensitivity.xlsx

1. Input Data

Guidance Not Used in this Calcs as onsite WwTW is used instead

Indicative nitrogen budget for new development - Scoping data

Client name Development name Development location (grid reference) Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	Folkstone and Hythe DC Otterpool Park Garden Town - Masterplan Framework Only TR112 365 8704 1296		
Hotel Bedrooms (Class C1) Local Planning Authority	117 Folkstone and Hythe DC		
-	Figures	Units	Data source
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l	
		-	Southern Water - annual mean
			currently consented Total
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l
······, ····, ····, ·····, ·····, ·····, ·····, ·····, ·····, ·····, ·····, ····, ····, ····, ·····, ·····, ····		g.:	g-
			Not available at present from the
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency

Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	°	Not available at present from the Environment Agency Environment Agency - this is indicative annual mean Total	
Total Phosphorous proposed consent for this treatment works, if any, (if Know Total area of site			Phosphorous value for the proposed consent to accommodate Otterpool See Proposed Land Use Tab	Not Used in this Calcs as onsite WwTW is used instead Otterpool Park FMP Only
New Urban Area	289.5	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of designated Suitable Alternative Natural Space (SANG)/open space	244.60	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of Community Farm/Allotments	9.8		See Proposed Land Use Tab Based on the habitat survey info presented in the previous OP Outline Planning Application in 2019, consultations with FHDC &	Otterpool Park FMP Only
Current land use nitrate loss from current site land use	A mixture of arable land, improved grassland & species poor semi- improved grassland (see the breakdown in Table 1 below See Table 1 below		Land Agents etc. See Existing Land Type Tab	

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	5
Lowland Grazing Livestock	119.1	12.2	0.24	1
Racetrack	13.5	13.3		Average of urban & lowland grazing livestock loss rates used.
Hay Cut	18.9	5	0.14	1
Other Grassland/Greenfield	101.1	5	0.14	1
Mixed area - Urban	11.5	14.3	0.83	3
Mixed area - Greenfield	4.5	5	0.14	1
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	3
	613.4			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142 7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

			Average Nutrient Loss Rate
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)
CSD9B (Cereals)		27.3	0.36
CSD9B (Urban)		14.3	0.83
CSD9B (Other Grassland/greenfield)		5	0.14
CSD9A (Urban)		14.3	0.83
CSD9A (Other Grassland/greenfield)		5	0.14
	0.00		

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

2. Otterpool FM@110(S1)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	Otterpool Park Garden Town - Masterplan Framework Only		
Number of residential dwellings (Class C3)	8704		
Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1)	1296 117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate Step 2 confirm water use (litres per person)	2.4	Natural England recommendation I/p/d Natural England recommendation - for resinential Class C1	
	350	/p/d British Water recommendation - for residential Class C2	No allowance included for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW	l/p/d British Water recommendation - for Hotel Class C1 NAV	No allowance include for Otterpool water efficiency measures N/A - This calculation is alternative for onsite WwTW option.
and permitted TN concentration Permitted Total Phosphate concentration	N/A N/A		N/A - This calculation is alternative for onsite WwTW option. N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool	7.2	mg/I Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to accommodate Otterpool	0.1	ma/I Severn Trent Connect	ST Connect's committed TP value. Onsite WwTW permit u/s outfall option.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would exit the WwTW after treatment			
Additional population (Residential Class C3)	20889.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)	3110.4	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3456696	litres/day	
Receiving WwTW environmental permit for TN Receiving WwTW environmental permit for TP		mg/I TN mg/I TP	ST Connect's UCAS certified TN value ST Connect's committed TP value. Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit	6.48	mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit TN discharged after WwTW treatment	0.09 22399390.08	mg/I TP mg/TN/day	
TP discharged after WwTW treatment	311102.64	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	8175.78 113.55	kg/TN/yr kg/TP/yr	
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland Grazing Livestock), Hay Cut, Mixed and Other		
	Grassland (see the breakdown in Table 2		
	below and 'Land Type Overview' Tab) - this largely based on the habitat survey info		
Current land use	presented in the previous OP Outline Planning Application in 2019		Sellindoe CSD9A & CSD9B Sites included separately based on available data .
	rippilouidri in 2010.		
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/yr	
Total nitrate loss from current land use Total Phosphate loss from current land use	11573.19 196.26	kgN/yr kaP/yr	See Table 2A/2B See Table 2A/2B
Stage 3	Figures	units/ Data source	Further information
New urban area	289.5	hectares/site layout	See Proposed Land Use Tab
Urban area nitrogen load Urban area phosphate load		kgN/ha/yr kgP/ha/yr	
Nitrogen load from future urban area	4139.85	kgN/yr	
Phosphorous load from future urban area	240.29	kaDhur	
			Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input
New SANG/open space SANG/open space nitrogen load	244.6	ha kgN/ha/yr	Data Tab and Proposed Land Use Tab for details.
SANG/open space phosphorous load	0.14	kgP/ha/yr	
Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space	1223	kgN/yr kgP/yr	
New Community Farm/Allotments area	9.8	ha	See Input Data Tab and Proposed Land Use Tab for details.
New Community Farm/Allotments nitrogen load New Community Farm/Allotments phosphorous load	23.5	kgN/ha/yr kgP/ha/yr	
* Note that Sellindge Sites are not applicapable for this calculate	a 230.30	kgN/yr	
Phosphorous Load from New Community Farm/Allotments New Woodland	35	kgP/yr ha	See Proposed Land Use Tab
New Woodland Area nitrogen load	5	kgN/ha/yr	
New Woodland Area phosphorous load Nitrogen Load from New Woodland	0.02	kgP/ha/yr kgN/yr	
Phosphorous Load from New Woodland	0.70	kgP/yr	
Combined nitrogen load from future land uses Combined phosphorous load from future land uses	5768.15	kgN/yr	

udget is provided in good faith, populated using the cience and expert option and adhering to the rinciple. Arcadis accept no responsibility from loss ever incurred as a direct or indirect result of action available

sting Land Types and Nutrient Loss Rates (Otterpool Ma

		Average Nutrient Lo	oss Rate	Estimated Nutrie	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

ble 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

Average Nutrient Loss Rate		iss Rate	Estimated Nutrie	ant loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
t Note that Callindes Cities are not employed by a sheet surgery of a cash OEMA is included)					

Stage 1 to Stage 3 Nutrient Loading Calcs Summary					
	TN (kgN/yr)	TP (kgP/yr)			
Stage 1 - WwTW load	8175.8	113.6			
Stage 2 - existing agriculture landuse load	11573.2	196.3			
Stage 3 - proposed development landuse load	5768.2	278.0			

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	8175.8	113.6	
Step 2 (Stage 3 - Stage 2)	-5805.0	81.7	
Step 3 (Step 1 + Step 2)	2370.7	195.3	
Step 4 (= Step 3, i.e. N/P budget without buffer)	2370.7	195.3	
Step 5 (Step 4*20%)	474.1	39.1	
Step 6 (Step 4 + Step 5)	2844.9	234.3	

sphorous Budget with 20% buffer

3. Otterpool FM@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	Town - Masterplan Framework Only		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	8704 1296		
Hotel Bedrooms (Class C1)	1290		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate		Natural England recommendation	
Step 2 confirm water use (litres per person)	110	l/p/d Natural England recommendation - for resinential Class C1 l/p/d British Water recommendation - for residential Class C2 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
			75% of the BW value assumed to account for Otterpool water enciency measures 75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW	NAV	N/A - This calculation is alternative for onsite WwTW option.
and permitted TN concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Permitted Total Phosphate concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate	7.2	mg/l Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to	1.2	nigh Sevent Henr Connect	ST Connects COND Certilieu Tri Valde
Proposed permitted Total Phosphate concentration to	0.1	ma/l Severn Trent Connect	ST Connect's committed TP value. Onsite WwTW nermit u/s outfall ontion
Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.1		
exit the WwTW after treatment			
Additional population (Residential Class C3)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)	3110.4	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3166986	litres/dav	
Receiving WwTW environmental permit for TN	7.2	mg/I TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP	0.1		ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit 90% of the proposed consent TP limit		mg/l TN mg/l TP	Applied 90% correction as a precautionary basis.
TN discharged after WwTW treatment	20522069.28	mg/TN/day	
TP discharged after WwTW treatment	285028.74	mg/TP/day	
Annual wastewater total nitrogen load	7490.56	kg/TN/yr	
Annual wastewater total phosphorous load	104.04	kg/TP/yr	
Stage 2	Figures	Units/ Data source	Further information
	A mixture of arable land (i.e. Cereals/Lowland Grazing	Ecology Survey report reference/remote imagery	
	Livestock), Hay Cut, Mixed and		
	Other Grassland (see the		
	breakdown in Table 2 below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey		
	info presented in the previous OP		
	Outline Planning Application in		
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B		
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/yr	
Total nitrate loss from current land use Total Phosphate loss from current land use	11573.19 196.26	kgN/yr koB/ur	See Table 2A/2B See Table 2A/2B
	-		
Stage 3 New urban area	Figures	units/ Data source hectares/site lavout	Further information See Proposed Land Lise Tab
New urban area Urban area nitrogen load		hectares/site layout kgN/ha/vr	oee Froposeu Lanu USE Tab
Urban area phosphate load	0.83	kgP/ha/yr	
Nitrogen load from future urban area	4139.85	kgN/yr	
		t-Dé -	
Phosphorous load from future urban area	240.29	кдечуг	Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
New SANG/open space	244.6	ha	and Proposed Land Use Tab for details.
SANG/open space nitrogen load	5	kaN/ha/vr	
SANG/open space phosphorous load Nitrogen Load from SANG/open space	0.14	kgP/ha/yr	
Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space	1223	kgN/yr kgP/yr	
New Community Farm/Allotments area	9.8	ha	See Input Data Tab and Proposed Land Use Tab for details.
New Community Farm/Allotments nitrogen load	23.5	kgN/ha/yr	
New Community Farm/Allotments phosphorous load * Note that Sellindge Sites are not applicapable for this calcula	0.28	kgP/ha/yr kgN/yr	
Phosphorous Load from New Community Farm/Allotments	230.30 2.74	kgP/yr	
New Woodland	35	ha	See Proposed Land Use Tab
New Woodland Area nitrogen load	5	kgN/ha/yr	
New Woodland Area phosphorous load Nitrogen Load from New Woodland	0.02	kgP/ha/yr kgN/yr	
Phosphorous Load from New Woodland	0.70	kgP/yr	
Combined sites on lead from 6 dues land uses			
Combined nitrogen load from future land uses Combined phosphorous load from future land uses	5/68.15	kgP/yr	
Combined nitrogen load from future land uses	5768.15 277.97	kgN/vr	

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precationary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Other Grassland/Greenfield Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss R	ate	Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).					

Note that Seminuge Sites are not applicapable for this calculation sheet purpose (i.e. only t

Stage 1 to Stage 3 Nutrient Loading Calcs Summary					
	TN (kgN/yr)	TP (kgP/yr)			
Stage 1 - WwTW load	7490.6	104.0			
Stage 2 - existing agriculture landuse load	11573.2	196.3			
Stage 3 - proposed development landuse load	5768.2	278.0			

104.0 81.7 185.7 185.7 37.1
185.7 185.7 37.1
185.7 37.1
37.1
222.9
222.9
222.9

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Severn Trent Connect - onsite WwTW	2845	234	2023	223

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Severn Trent Connect - onsite WwTW	3.1	19.5	2.2	18.6

Assumed Wetlar	d TN removal rate	
Assumed Wetlar	d TP removal rate	

93 g/m2/yr 1.2 g/m2/yr

930 kg/ha/yr 12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d

PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ba)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A	New Orban Area (ila)				nouses (NO)
Sellindge CSD9B					
CSD9A & 9B TOTAL	0	0.00	0		0

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTERPOOL FRAMEWORK MASTERPLAN

	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	<u>65</u>
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	244.6	Increased S
Total Urban Area in Framework Masterplan	289.5	Reduced u
Total OP Framework Area Check	756.1	

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

SANG area by 61 to account for other SuDS & Openspace in development parcels - For Sensitivity Testing

urban area by 61 to account for other SuDS & Openspace in development parcels - For Sensitivity Testing

Onsite WwTW

Scenario 1 - Combined Land Use and WwTW Discharges Loading

1D - Otterpool NN (V1.8) - Onsite WWTW- OFMA & Sellindge – Sensitivity.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name		Folkstone and Hythe DC	
		Masterplan Framework (incl	
Development name		CSD9A & CSD9B)	
Development location (grid refe	rence)	TR112 365	https://gridreferencefinder.com/
Number of residential dwellings	(Class C3)	9054	
Number of residential dwellings	(Class C2)	1296	
Hotel Bedrooms (Class C1)		117	
Local Planning Authority		Folkstone and Hythe DC	

	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instead
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known) N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
			Environment Agency - this is indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know		mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site	784.1	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
New Urban Area	308.0	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
		liootai oo		
Area of designated Suitable Alternative Natural Space (SANG)/open space	254.10	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
			Based on the habitat survey info	
			presented in the previous OP	
			Outline Planning Application in	
			2019, consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved			
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below	kgN/ha/yr		
nitrate loss from current site land use	See Table 1 below	rgin/lia/yi		

		Aver	Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)		
Cereals	324.9	27.3	0.36		
Lowland Grazing Livestock	119.1	12.2	0.24		
				Average of urban & lowland grazing livestock loss rates	
Racetrack	13.5			grazing livestock loss rates	
		13.3	0.5	used.	
Hay Cut	18.9	5	0.14		
Other Grassland/Greenfield	101.1	5	0.14		
Mixed area - Urban	11.5	14.3	0.83		
Mixed area - Greenfield	4.5	5	0.14		
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83		

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

			Average Nutrient Loss Rate
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)
CSD9B (Cereals)	17.16	27.3	0.36
CSD9B (Urban)	0.7	14.3	0.83
CSD9B (Other Grassland/greenfield)	1.05	5	0.14
CSD9A (Urban)	0.08	14.3	0.83
CSD9A (Other Grassland/greenfield)	8.98	5	0.14
	27.97		

2. Otterpool FM+CSD9A&B@110(S1)

Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development	Framework (incl CSD9A & CSD9B)		
Number of residential dwellings (Class C3)	9054		
Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1)	1296 117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate Step 2 confirm water use (litres per person)	2.4	Natural England recommendation l/p/d Natural England recommendation - for resinential Class C1	
Step 2 commit water use (muss per person)	350	l/p/d British Water recommendation - for residential Class C2	No allowance included for Otterpool water efficiency measures
	300	I/p/d British Water recommendation - for Hotel Class C1	No allowance include for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW	NAV	N/A - This calculation is alternative for onsite WwTW option.
and permitted TN concentration Permitted Total Phosphate concentration	N/A N/A		N/A - This calculation is alternative for onsite WwTW option. N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate	NA		N/A - This calculation is alternative for onsite www.rw.option.
Otterpool	7.2	mg/I Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool	0.1	mg/I Severn Trent Connect	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment Additional population (Residential Class C3)	21729.6	Percone	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C3) Additional population (Residential Class C2)	21/29.6	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3549096	litres/day	
Receiving WwTW environmental permit for TN		mg/I TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit	0.1	mg/I TP mg/I TN	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option. Applied 90% correction as a precautionary basis.
90% of the proposed consent TN limit 90% of the proposed consent TP limit		mg/TP	Apprice ao /e correction as a precautional y basis.
TN discharged after WwTW treatment	22998142.08	mg/TN/day	
TP discharged after WwTW treatment	319418.64	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	8394.32	kg/TN/yr kg/TP/yr	
Annual wastewater total prosphorous load	116.59	Ng/TF/yi	
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland		
	Grazing Livestock), Hay Cut, Mixed and Other Grassland (see the breakdown in Table 2		
	below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey info		
	presented in the previous OP Outline Planning		
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Nilrate loss from current site land use	See Table 24/28	kaNiha'ye	
Nitrate loss from current site land use	See Table 24/2B	kgNihaiyr	
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/vr	See Table 20/2B
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B	knP/halyr knNvr	See Table 2A/2B See Table 2A/2B
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use	See Table 2A/2B 12102.96 204.49	knP/hayr KaNvr kgP/yr	See Table 2A/2B
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3	See Table 24/2B 12102.96 204.49 Figures	knPihalyr kdNyr kgPlyr units/ Data source	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 2A/2B 12102.96 204.49 Figures 308.0	knP/hayr knNyr kgPlyr hectares/site layout	See Table 2A/2B
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area initioen load	See Table 24/2B 12102.96 204.49 Figures 308.0 14.3	knP/halyr kdN/yr kgP/yr units/ Data source hectares/sile layout koNhalyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 24/2B 12102.96 204.49 Figures 308.0 14.3	knP/hayv kgP/yr ectares/site layout kgP/hayv KgP/hayv	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 12102.96 204.49 Figures 0.83 0.83 0.83	knP/hayv kgP/yr ectares/site layout kgP/hayv KgP/hayv	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 12102.96 204.49 Figures 0.83 0.83 0.83	knP/hayv kgP/yr ectares/site layout kgP/hayv KgP/hayv	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 12/192.96 204.49 Figures 403.97 4403.97	knPhatyr kgNyr kgPlyr Inclares/site layout kgNhatyr kgNhatyr kgNhatyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area	See Table 24/28 12/102.96 204.49 Figures 306.0 143 143 4403.97 255.62	knPhalyr kgPlyr mits/ Data source becares/site layout kgNhalyr kgPhalyr kgPhalyr kgPhyr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 Wew urban area Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlogen space	See Table 24/28 12102.96 204.49 Figures 0.83 4403.97 225.52 254.1	knP/hayr kgPlyr tgPlyr units/ Data source hectares/site layout kgPhayr kgNnyr kgPlyr ha	See Table 2A2B Further Information See Proposed Land Use Tab
Phosphate loss from current land use Total nitrate less from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space	See Table 24/28 12/102.96 204.49 Figures 306.0 14.3 0.83 403.37 403.37 255.62 255.62 254.1 5	koPhalyr kgPlyr hedarea/site layout kgPhalyr kgPhalyr kgPhalyr kgPlyr ha	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input
Phosphate loss from current land use Total nitrate less from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitrogen load SANGlopen space phosphorous load SANGlopen space	See Table 24/28 12/152.96 204.49 Figures 306.0 14.3 0.83 440.37 255.62 254.1 5 0.14 15 0.14 1720.5	koPhayr koNyr kgPlyr units/ Data source hestarea/ute layout kgPhayr kgPhayr kgPhyr ha kgPhyr ha kgNnayr kgNnayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input
Phosphate loss from current sile land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 Wew urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorcous load from future urban area New SANG/logen space SANG/logen space nitrogen load SANG/logen space nitrogen load SANG/logen space	See Table 2A/28 12102.96 204.49 Figures 305.0 143.3 4403.97 255.62 254.1 5 0.14 1270.5 35.57	knPhayr kgPlyr tgPlyr tectares/site layout kgPhayr kgNrayr kgPlyr ha kgPhayr kgPhyr ha	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current late use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space	See Table 24/28 12/102.96 204.49 Figures 306.0 14.3 0.33 4403.37 4403.47 255.62 254.1 5 0.14 15 0.14 15 0.14 15 0.14 9.8 35.7 9.8 9.8 9.8 9.8 9.8 9.8 9.8 9.8	koPhayr kgPlyr units/ Data source hctares/ute layout kgPhayr kgPhayr kgPlyr ha kgPhyr ha kgPhyr ha kgPhyr kgPhayr kgPhayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stege 3 Wear untan area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space SANG/open space SANG/open space New Community Farm/Aldoments area New Community Farm/Aldoments area	See Table 24/28 12102.36 204.49 Figures 0.83 4403.97 255.62 254.1 0.14 1270.5 0.14 1270.5 35.57 9.8 23.57 9.8 23.5	knPhayr knNvr kgPlyr tectares/site layout kgNhayr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current sile land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Wrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitrogen load SANGlopen space nitrogen load SANGlopen space nitrogen load SANGlopen space Phosphorous Load from SANGlopen space Phosphorous Load from SANGlopen space New Community Farm/Alditenets area New Community Farm/Alditenets nitrogen load New Community Farm/Alditenets nitrogen load	See Table 2A/2B 12/102.96 204.49 Figures 306.0 14.3 0.33 4403.37 403.37 403.47 255.62 254.1 5 0.14 15 0.25 0.28	knP/hayr kxNvr kgP/yr ectares/site layout kgVhayr kgVhayr kgVhayr kgP/yr ha kgNayr kgP/yr ha kgAnayr kgP/ayr ba ba ba ba	See Table 2A2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use What area nitrogon load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space SANG/open space New Community Farm/Alictments area New Community Farm/Alictments Stoephosphorous load Nitrogen Load from SANG/open space New Community Farm/Alictments area	See Table 24/28 12102.36 204.49 Figures 306.0 14.3 .0.33 4403.97 255.62 254.1 0.14 1270.5 0.14 1270.5 0.14 1270.5 0.28 23.57 0.28 23.0	knPhayr kgPlyr tgPlyr tgPhyr kgPhayr kgPhayr kgPlyr kgPlyr ha kgPhayr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr	See Table 2A2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 What area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space SANGlopen space SANGlopen space SANGlopen space SANGlopen space SANGlopen space SANGlopen space New Community Farm/Altothents area New Community Farm/Altothents Phosphorous Load from SANGreen Space Phosphorous Load from SANGlopen space New Community Farm/Altothents Phosphorous Load from SANGlopen Space New Community Farm/Altothents Phosphorous Load from New Community Farm/Altothents Phosphorous Load from New Community Farm/Altothents	See Table 24/28 12102.36 204.49 Figures 4403.97 4403.97 255.62 254.1 1270.5 35.57 9.8 225.22 241 1270.5 35.57 9.8 225.32 230.30 230.30 244 35.57 28.35 28.3	knPhayr knNvr kgPlyr tectares/site layout kgNhayr kgNyr kgNyr kgNyr kgNyr ha kgNayr kgPhyr ha ba	See Table 2A2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
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Disclaime

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting the additional option of the science this nitrogen budget and the figures conta

able 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Frame

Table 24 - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)					
		Average Nutrient Lo		Estimated Nutri	ient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban Mixed area - Greenfield	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Lo	ss Rate	Estimated Nutrie	ant loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)	17.16	27.3	0.36	468.47	6.18
	0.7	14.3	0.83	10.01	0.58
CSDB4 (Other Grassland/greenfield) CSD94 (Urban) CSD94 (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calcs Summary				
	TN (kgN/yr)	TP (kgP/yr)		
Stage 1 - WwTW load	8394.3	116.6		
Stage 2 - existing agriculture landuse load	12103.0	204.5		
Stage 3 - proposed development landuse load	6079.8	294.6		

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	8394.3	116.6	
Step 2 (Stage 3 - Stage 2)	-6023.2	90.1	
Step 3 (Step 1 + Step 2)	2371.1	206.7	
itep 4 (= Step 3, i.e. N/P budget without buffer)	2371.1	206.7	
tep 5 (Step 4*20%)	474.2	41.3	
Step 6 (Step 4 + Step 5)	2845.4	248.1	

gen/Phosphorous Budget with 20% buffer

3. Otterpool FM+CSD9A&B@110(S2)

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head before the first of the fi	Number of residential dwellings (Class C3)	9054		
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mini generation (Microarchite) (Micr		225	/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
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Nitogen Load from Community Farm/Aldments 20.30 kpWy Phosphorous Load from New Community Farm/Aldments 2.74 kpVpr	New Community Farm/Allotments nitrogen load	23.5	kgN/ha/yr	
Phosphorous Load from New Community Farm/Allotments 2.74 kgP/yr	New Community Farm/Allotments phosphorous load	0.28	kgP/ha/yr	
······································	Nitrogen Load from Community Farm/Allotments			
New Woodland 35 ha See Proposed Land Use Tab		2.74	ha	See Proposed Land Use Tab
New Woodland Area nitrogen load 5 kgN/ha/yr	New Woodland Area nitrogen load	5	kgN/ha/yr	
New Woodland Area phosphorous load 0.02 (kg/Phaly) Witrogen Load from New Woodland 175 (kg/Vyr	New Woodland Area phosphorous load	0.02	kgP/ha/yr	
Nitrogen Load from New Woodland 172 kg/Vyr Phosphorous Load from New Woodland 070 kg/Vyr	Phosphorous Load from New Woodland	1/5	kgP/yr	
Combined nitrogen load from future land uses 6073.77 kp3/vr Combined notportorus load from future land uses 294.63 kp3/vr	Combined nitrogen load from future land uses	6079.77	kqN/yr	
Crumonian burophronone ream runni minite rang (1562) 249-09 (KG+7)/L		294.63	INJF ()1	

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the preautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss Rate		Estimated Nutr	ient ioss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss R	ate	Estimated Nutri	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD0B (Other Creekland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load	7709.1	107.1	
Stage 2 - existing agriculture landuse load	12103.0	204.5	
Stage 3 - proposed development landuse load	6079.8	294.6	
Stage 4 - Net Change in Nitrogen and Phosphorous Budget	t.		
	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	7709.1	107.1	
Step 2 (Stage 3 - Stage 2)	-6023.2	90.1	
Step 3 (Step 1 + Step 2)	1685.9	197.2	
Step 3 (Step 1 + Step 2)	1685.9	197.2	
Step 3 (Step 1 + Step 2) Step 4 (= Step 3, i.e. N/P budget without buffer)	1685.9 1685.9	197.2 197.2	
Step 3 (Step 1 + Step 2) Step 4 (= Step 3, i.e. N/P budget without buffer) Step 5 (Step 4*20%)	1685.9 1685.9 337.2	197.2 197.2 39.4	
Step 3 (Step 1 + Step 2) Step 4 (= Step 3, i.e. N/P budget without buffer) Step 5 (Step 4*20%)	1685.9 1685.9 337.2	197.2 197.2 39.4	
Step 3 (Step 1 + Step 2) Step 4 (= Step 3, i.e. N/P budget without buffer) Step 5 (Step 4*20%)	1685.9 1685.9 337.2 2023.1	197.2 197.2 39.4 236.7	
Step 3 (Step 1 + Step 2) Step 4 (= Step 3, i.e. N/P budget without buffer) Step 5 (Step 4*20%)	1685.9 1685.9 337.2 2023.1	197.2 197.2 39.4 236.7	

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Sce	PCC (Scenario 1)		nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Severn Trent Connect - onsite WwTW	2845	248	2023	

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Scenario 1)		PCC (Scenario 2)		
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (
Severn Trent Connect - onsite WwTW	3.1	20.7	2.2		

Assumed Wetland TN removal rate	93 g/m2/yr	930 kg/ha/yr
Assumed Wetland TP removal rate	1.2 g/m2/yr	12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

	237
	237
a (ha)	

19.7

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A	7.56	1.50	9.06	83%	188
Sellindge CSD9B	10.91	8.00	18.91	58%	162
CSD9A & 9B TOTAL	18.47	9.50	27.97		350

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTT	ERPOOL FRAMEWORK MAS	TERPLAN	
	На	Ha	
Excluded Retained Existing Land			
Existing community in framework masterplan area	71.0		
Retained farmland in framework masterplan area	<u>49.4</u>		
Existing Roads	10.0		
Existing vegetation/buildings/ waterbodies/ ecological features within the current			
OPA boundary	16.8	147.2	
Excluded Mitigation Land From SANG			
Wetlands	30	<u>65</u>	
Woodland *	35		
Community Farm/Allotment Land in current OPA boundary	9.8		
Remaining Total SANG in Framework Masterplan*	244.6	Increased SANG	G area by 61 to account for other Sul
Total Urban Area in Framework Masterplan	289.5	Reduced urban	n area by 61 to account for other SuD
Total OP Framework Area Check	756.1		

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

ent parcels - For Sensitivity Testing

nt parcels - For Sensitivity Testing

Onsite WwTW

Scenario 2 - WwTW Discharges Only Loading

2A - Otterpool NN (V1.8) - Onsite WwTW - Tier 1 OPA DWF.xlsx

1. Input Data

Indicative Nutrient budget for new development - Scoping data

Client name	Folkstone and Hythe DC			
	Otterpool Park Garden Town - Tier			
Development name	1 OPA Only			
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/		
Number of residential dwellings (Class C3)	7855	Tier 1 OPA Dwellings Only		
Number of residential dwellings (Class C2)		Tier 1 OPA Dwellings Only		
Hotel Bedrooms (Class C1)	117	···· · · · · · · · · · · · · · · · · ·		
Local Planning Authority	Folkstone and Hythe DC			
		•		
	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instea
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
		-	Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
,		5		
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	NI/A	mg/l	Environment Agency	
rotar win ogen proposed consent for this treatment works, it any, (If Known)	N/A	ing/i	Environment Agency - this is	
			indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
				Not Lload in this Color on anothe MinTM is used if it is
Total Phosphorous proposed consent for this treatment works, if any, (if Know	0.3	mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site		hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
New Urban Area		hectares		
Area of designated Suitable Alternative Natural Space (SANG)/open space		hectares		
Area of Community Farm/Allotments		hectares		
		nootaros		
Current land use				
	See Table 1 below	kgN/ha/yr		
וווימוב ווספי וויטווו כעודפוון אופי ומווע עצפ	See Table T below	Ng N/ Ha/ yi		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals		27.3	0.36	
Lowland Grazing Livestock		12.2	0.24	
Racetrack				Average of urban & lo grazing livestock loss
		13.3	0.5	used.
Hay Cut		5	0.14	
Other Grassland/Greenfield		5	0.14	
Mixed area - Urban		14.3	0.83	
Mixed area - Greenfield		5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B		14.3	0.83	

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
CSD9B (Cereals)		27.3	0.36	
CSD9B (Urban)		14.3	0.83	
CSD9B (Other Grassland/greenfield)		5	0.14	
CSD9A (Urban)		14.3	0.83	
CSD9A (Other Grassland/greenfield)		5	0.14	

* Note all land use data is excluded because only extra DWF nutrient budget from Tier 1 OPA is considered in this assessment

2. Otterpool FM@110(S1)

New development nitrogen budget

Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Tier 1 OPA		
Development	Only		
Number of residential dwellings (Class C3)	7855	Tier 1 OPA Dwellings Only	
Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1)	645 117	Tier 1 OPA Dwellings Only	
Local Planning Authority	Folkstone and Hythe DC		
Local Flaining Automy	T GRADNE and Tryate DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate	2.4	Natural England recommendation	
Step 2 confirm water use (litres per person)		l/p/d Natural England recommendation - for resinential Class C1	
	350	l/p/d British Water recommendation - for residential Class C2 l/p/d British Water recommendation - for Hotel Class C1	No allowance included for Otterpool water efficiency measures No allowance include for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW		N/A - This calculation is alternative for onsite WwTW option.
and permitted TN concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Permitted Total Phosphate concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool	7.2	mg/I Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool	0.1	mg/I Severn Trent Connect	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment Additional population (Residential Class C3)	40050	Persons	Assumed 2.4 Ossuesses Bateless dualling
Additional population (Residential Class C3) Additional population (Residential Class C2)		Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)		Persons	Assumed 2.4 Occupancy Rate/per oweiling Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	2685720	litres/day	
Receiving WwTW environmental permit for TN	7.2	mg/I TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP	0.1	mg/I TP	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit		mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit TN discharged after WwTW treatment	0.09 17403465.6	mg/I TP	
TP discharged after WwTW treatment		mg/TP/day	
Annual wastewater total nitrogen load		kg/TN/yr	
Annual wastewater total phosphorous load	88.23	kg/TP/yr	
Stage 2	Figures	Units/ Data source	Further information
Current land use			
Total area of existing 'agricultural' and other land			
5 5			
Nitrate loss from current site land use			
Phosphate loss from current site land use			
Total nitrate loss from current land use Total Phosphate loss from current land use			
Total Prosphate loss from current land use			
Stage 3	Figures	units/ Data source	Further information
New urban area			
Urban area nitrogen load			
Urban area phosphate load			
Nitrogen load from future urban area			
Nitrogen load from future urban area			
Nitrogen load from future urban area Phosphorous load from future urban area			
Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space			
Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space litogen load			
Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space phosphorous load			
Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space phosphorous load SANG/open space phosphorous load Nitrogen Load from SANG/open space			
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This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

	Average Nutrient Loss Rate		Estimated Nutr	
Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
	Mectaree			

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutr		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)	
CSD9B (Cereals)						
CSD9B (Urban)						
CSD9B (Other Grassland/greenfield)						
CSD9A (Urban)						
CSD9A (Other Grassland/greenfield)						
Note all land use data is excluded bacause only extra DWF nutrient budget from Tier 1 OPA is considered in this assessment						

Stage 1 to Stage 3 Nutrient Loading Calcs Summary			1
	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load	6352.3	88.2	
Stage 2 - existing agriculture landuse load			Land Use Fully Excluded
Stage 3 - proposed development landuse load			Land Use Fully Excluded

Stage 4 - Net Change in Nitrogen and Phosphorous Budget			
	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	6352.3	88.2	
Step 2 (Stage 3 - Stage 2)	0.0	0.0	
Step 3 (Step 1 + Step 2)	6352.3	88.2	
Step 4 (= Step 3, i.e. N/P budget without buffer)	6352.3	88.2	
Step 5 (Step 4*20%)	1270.5	17.6	
Step 6 (Step 4 + Step 5)	7622.7	105.9	
	7622.7	105.9	Only extra DWF Nutrient Budget Inc

Nitrogen/Phosphorous Budget with 20% buffer

3. Otterpool FM@110(S2)

New development nitrogen budget	
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Under Diese schlutz Forder Konk Obsissen Forder of homes of home	Client Development Number of residential dwellings (Class C3) Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1)	Folkstone and Hythe DC Park Garden Town - Tier 1 OPA Only 7855 645 117	Tier 1 OPA Dwellings Only Tier 1 OPA Dwellings Only	
Sing Testing and the source of	Local Planning Authority			
Concurrent ID A field Egystement Concerned Data (1) Provide ID water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water a sound to account for Data (2) Provide ID Water	Stage 1	Figures	Units/ Data source	Further information
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Receive wirth warther metal part for TN Receive wirth warther metal part for TN Receive wirth warther metal part of TN Rece		2532720	litres/day	
Received work work work work work work work work		7.2	mg/I TN	ST Connect's UCAS certified TN value
gNX of proceed consert 71 Plant The characteristic MVX I besime Processional MX I besime Processional MX I besime Processional MX I besime Annual westwateristic I properties I consert Processional MX I besime Table area of existing legicultural and other land 0.00 min TP 100 min VX of the 22 999933 I vor TVice 22 99993 I vor TVice 22 9993	Receiving WwTW environmental permit for TP	0.1	mg/I TP	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
Bits 0 Bits		6.48	mg/I TN	Applied 90% correction as a precautionary basis.
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New Woodland Area phosphorous load hillion New Woodland	New Woodland Area nitrogen load			
Nitrogen Load from New Woodland	New Woodland Area phosphorous load			
	Nitrogen Load from New Woodland			
Combined nitrogen load from future land uses Combined phosphorous load from future land uses				

Disclaimer

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss Rate		Estimated Nutr	ient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals					
Lowland Grazing Livestock					
Racetrack					
Hay Cut					
Other Grassland/Greenfield					
Mixed area - Urban					
Mixed area - Greenfield					
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B					

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss M	(ate	Estimated Nutrient loss		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)	
CSD9B (Cereals)						
CSD9B (Urban)						
CSD9B (Other Grassland/greenfield)						
CSD9A (Urban)						
CSD9A (Other Grassland/greenfield)						
* Note all land use data is excluded because only extra DWF nutrient budget from Tier 1 OPA is considered in this assessment						

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Stage 1 to Stage 5 Nutrient Loading Sales Summary			
	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load	5990.4	83.2	
Stage 2 - existing agriculture landuse load			Land Use Fully Excluded
Stage 3 - proposed development landuse load			Land Use Fully Excluded

TN (kgN/yr) TP (kgP/yr) tep 1 (Stage 1) 5990.4 63.2 tep 2 (Stage 3 - Stage 2) 0.0 0.0 tep 3 (Step 1 + Step 2) 5690.4 63.2 tep 4 (= Step 3, is. NP budget without buffer) 5690.4 63.2 tep 5 (Step 4 - 20%) 1198.1 16.6 tep 6 (Step 4 + Step 5) 7188.5 99.8

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	DCC (Sa	amoria 1)	DCC /See	enario 2)
WwTW Option	TN (Kg/yr)	PCC (Scenario 1) TN (Kg/yr) TP (Kg/yr) TN		TP (Kg/yr)
Severn Trent Connect - onsite WwTW	7623		TN (Kg/yr) 7188	
Nutrient Mitigation - Wetland Area Requiremen	at Summary			
	PCC (Sc	enario 1)	PCC (Sco	enario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Severn Trent Connect - onsite WwTW	8.2	2 8.8	3 7.7	8.3
Assumed Wetland TN removal rate Assumed Wetland TP removal rate		g/m2/yr g/m2/yr		l kg/ha/yr ! kg/ha/yr
	PCC Scenario 1 Residential (Class C3) = 110 Residential (Class C2) = 350 Hotel (Class C1) = 300 l/p/d	0 l/p/d	PCC Scenario 2 Residential (Class C3) = 110 Residential (Class C2) = 262 Hotel (Class C1) = 225 l/p/d	

8. Wetland Hydraulic Loading

Wetland Details Summary

	Wetland Area				
Wetland_ID (See Note 1)	(m2)	Wetland Area (ha)	Wetland Depth (m)	Treatment depth (m)	Comments
					Receives wastewater discharge. The total footprint of the wetland is 13.0ha but only
					75% is taken as effective area (9.75ha) due to earth works required for cascade
W13	130129	13.01	0.50	0.25	wetland features.
	130129	13.01			

Preliminary Hydraulic Loading Calcs For Wastewater Wetland (W13)

	Effective Wetland Area (m2) - See Note 4	Effective Wetland Depth (m)	Max Dry Weather Flow, DWF (m3/day)	Hydraulic Retention Time, HRT (days) - See note 5	Hydraulic Loading Rate, HRT (m/day) - See Note 5
OPTION 1 - Assuming 50mm effective treatment depth	97597	0.05	2685.72	1.8	0.03
OPTION 2 - Assuming 150mm effective treatment depth	97597	0.15	2685.72	5.5	0.03
OPTION 3 - Assuming 250mm effective treatment depth	97597	0.25	2685.72	9.1	0.03

	The hydraulic residence
one	(HRT) was calculated as follows
	Wetland volume (m ²)
	Outflow rate (m ¹ /day)
The Mary	e hydraulic loading rate (HUR) waa calculated as 6:
	Infow rate (m ² /day)
	HLK(M/QBY)= Wetland surface area (m ²)

Hydraulic residence times and loading rates

Wetland nutrient removal efficiency is widely considered to be dependent upon both the HLR and the HRT (Dong et al., 2011). A high effluent loading rate coupled with a short residence time will typically overload the ICW, giving insufficient contact time for physical, chemical and biological removal of pollutants. For this reason, HRTs of 5-30 days and HLRs of < 0.1 m/day have been recommended (Wu et al., 2015). Shallow water depths (<50 cm) are also recommended to increase the contact time between effluent and wetland sediment, whilst also keeping water oxygenated through good contact with the atmosphere (Wu et al., 2015). https://onlinelibrary.wiley.com/doi/epdf/10.1111/wej.12605

Notes

Proposed Wetland locations are shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0041-P3 (Proposed Nutrient Mitigation Strategy) in Appendix F.
 Proposed Surface Water Drainage Zones are shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0007-P7 (Surface Water Drainage Zones and Runoff Rates) in Appendix J.
 Proposed Surface Water Drainage Strategy is shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-00014-P4 (Surface Water Drainage Strategy Overview) in Appendix J.
 Toposed Surface Water Drainage Strategy is shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0014-P4 (Surface Water Drainage Strategy Overview) in Appendix J.
 Total wetland area for W13 is 13.0114 but assumed 75% for refervie wetland reae and remaining 25% for creating bunds for crascade features (i.e. @ 1 in 20 existing ground slope).
 The above shows that HRT of > 5 days and HLR of < 0.1 m/day can be achieved with the proposed WwTW wetland W13 (Option 3 - 250mm effective treatment depth) and therefore meets the recommended wetland design guidance.

Onsite WwTW

Scenario 2 - WwTW Discharges Only Loading

2B - Otterpool NN (V1.8) - Onsite WwTW - OFMA DWF.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC	
	Otterpool Park Garden Town -	
Development name	Masterplan Framework Only	
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/
Number of residential dwellings (Class C3)	8704	OFMA Dwellings only
Number of residential dwellings (Class C2)	1296	OFMA Dwellings only
Hotel Bedrooms (Class C1)	117	
Local Planning Authority	Folkstone and Hythe DC	
		•

	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instead
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
			Environment Agency - this is indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know	0.3	mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site	0.0	hectares		
		nootares		
New Urban Area		hectares		
Area of designated Suitable Alternative Natural Space (SANG)/open space		hectares		
Area of Community Farm/Allotments		hastaraa		
Area of Community Farm/Allotments		hectares		
Current land use nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		
Initiale ioss from current site land use		ing in the gr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals		27.3	0.36	
Lowland Grazing Livestock		12.2	0.24	
Racetrack		13.3		Average of urban & lowland grazing livestock loss rates used.
Hay Cut		5	0.14	
Other Grassland/Greenfield		5	0.14	
Mixed area - Urban		14.3	0.83	
Mixed area - Greenfield		5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B		14.3	0.83	

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr) Phosphorous (kg P/ha/yr)		
CSD9B (Cereals)		27.3	0.36	
CSD9B (Urban)		14.3	0.83	
CSD9B (Other Grassland/greenfield)		5	0.14	
CSD9A (Urban)		14.3	0.83	
CSD9A (Other Grassland/greenfield)		5	0.14	

* Note all land use data is excluded because only extra DWF nutrient budget from OFMA is considered in this assessment

2. Otterpool FM@110(S1)

New development nitrogen budget

Client	E B B B B B B B B B B		
Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development	Framework Only		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	8/04	OFMA Dwellings only OFMA Dwellings only	
Hotel Bedrooms (Class C1)	117	or we bwennigs only	
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate		Natural England recommendation //p/d_Natural England recommendation - for resinential Class C1	
Step 2 confirm water use (litres per person)		l/p/d British Water recommendation - for residential Class C1	No allowance included for Otterpool water efficiency measures
	300	l/p/d British Water recommendation - for Hotel Class C2	No allowance included for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW		N/A - This calculation is alternative for onsite WwTW option.
and permitted TN concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Permitted Total Phosphate concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate Otterpool			ST Connect's UCAS certified TN value
	1.2	mg/I Severn Trent Connect	ST Connects UCAS deruned TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool	0.1	mg/I Severn Trent Connect	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would exit the WwTW after treatment			
Additional population (Residential Class C3)	20889.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C3)	3110.4	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development		litres/day	
Receiving WwTW environmental permit for TN	7.2	mg/I TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit		mg/ITP mg/ITN	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option. Applied 90% correction as a precautionary basis.
90% of the proposed consent I N limit 90% of the proposed consent TP limit	6.48	mg/ITN mg/ITP	Applied 90% correction as a precautionary basis.
TN discharged after WwTW treatment	22399390.08	mg/TN/day	
TP discharged after WwTW treatment	311102.64	mg/TP/day	
Annual wastewater total nitrogen load	8175.78	kq/TN/yr	
Annual wastewater total phosphorous load	113.55	kg/TP/yr	
Stage 2	Florence	Units/ Data source	Further information
Current land use	Figures	Units/ Data source	Further Information
Content land dae			
Total area of existing 'agricultural' and other land			
Nitrate loss from current site land use			
Nitrate loss from current site land use			
Phosphate loss from current site land use			
Phosphate loss from current site land use Total nitrate loss from current land use			
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use			
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3	Figures	units/ Data source	Further information
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Phosphate loss from current site land use Total Intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area nitrogen load Phosphorous load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space	Figures	units/ Data source	Further information
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Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals					
Lowland Grazing Livestock					
Racetrack					
Hay Cut					
Other Grassland/Greenfield					
Mixed area - Urban					
Mixed area - Greenfield					
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B					

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)					
CSD9B (Urban)					
CSD9B (Other Grassland/greenfield)					
CSD9A (Urban)					
CSD9A (Other Grassland/greenfield)					
Note all land use data is excluded because only extra DWF nutrient budget from OFMA is considered in this assessment					

Stage 1 to Stage 3 Nutrient Loading Calcs Summary					
	TN (kgN/yr)	TP (kgP/yr)			
Stage 1 - WwTW load	8175.8	113.6			
Stage 2 - existing agriculture landuse load			Land Use Fully Exclude		
Stage 3 - proposed development landuse load			Land Use Fully Exclude		

Stage 4 - Net Change in Nitrogen and Phosphorous Budget

	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	8175.8	113.6
Step 2 (Stage 3 - Stage 2)	0.0	0.0
Step 3 (Step 1 + Step 2)	8175.8	113.6
Step 4 (= Step 3, i.e. N/P budget without buffer)	8175.8	113.6
Step 5 (Step 4*20%)	1635.2	22.7
Step 6 (Step 4 + Step 5)	9810.9	136.3
	9810.9	136.3

an / Phoenhorous Budget with 20% buffer

idget with 20% buffer

3. Otterpool FM@110(S2)

New development nitrogen budget Client Development Number of residential dwellings (Class C3) Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1) Local Planning Authority 8704 OFMA Dwellings only 1296 OFMA Dwellings only Folkstone and Hythe DC Stage 1 Step 1 calculate additional population Occupancy rate Step 2 confirm water use (litres per person) Figures Units/ Data source Further information 24 Natural England recommendation 10 (Vid/ Natural England recommendation 10 (Vid/ Natural England recommendation - for residential Class C1 262.5 (Vid/ British Water recommendation - for residential Class C2 (adjusted to 75%) 25 (Vid/ British Water recommendation - for Hotel Class C1 (adjusted to 75%) Onsite WHW NA 75% of the BW value assumed to account for Otterpool water efficiency measures 75% of the BW value assumed to account for Otterpool water efficiency measures N/A - This calculation is alternative for onsite WWTW option. N/A - This calculation is alternative for onsite WWTW option. Step 3 confirm Waste water Treatment Works (WwTW) and permitted TN concentration Permitted Total Phosphate concentration Proposed permitted Total Nitrogen concentration to accommodate Otterpool 7.2 mg/l Severn Trent Connect ST Connect's UCAS certified TN value Proposed permitted Total Phosphate concentration to accommodate Otterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would exit the WWTW after treatment Additional population (Residential Class C3) Additional population (Residential Class C3) Additional population (Aredic Class C4) Wastewater volume generated by development Receiving WWTW environmental permit for TN Receiving WWTW environmental permit for TP 90% of the proposed consent TP limit 90% of the proposed consent TP limit TN discharged after WWTW treatment TP discharged after WWTW treatment Annual wastewater total nitrogen load Annual wastewater total nitrogen load Proposed permitted Total Phosphate concentration to 0.1 mg/l Severn Trent Connect ST Connect's committed TP value, Onsite WwTW permit u/s outfall option. 20889.6 Persons 3110.4 Persons 234 Persons Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room 66986 litres/day 7.2 mg/l TN 0.1 mg/l TP 6.48 mg/l TN 316698 ST Connect's UCAS certified TN value ST Connect's committed TP value, Onsite WwTW permit u/s outfall option. Applied 90% correction as a precautionary basis. 0.48 mg/TN 0.09 mg/TP 522069.28 mg/TN/day 285028.74 mg/TP/day 7490.56 kg/TN/yr 104.04 kg/TP/yr Annual wastewater total phosphorous load Stage 2 Current land use Units/ Data source Further information Figures Total area of existing 'agricultural' and other land trate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Further information Figures units/ Data source Phosphorous load from future urban area New SANCicoen space SANGicoen space hitoponous load SANGicoen space phosphorous load Nitroan Load from SANGicoen space Phosphorous Load from SANGicoen space New Community Farm/Allotments area New Community Farm/Allotments introon Load New Community Farm/Allotments Phosphorous Load from New Community Farm/Allotments Phosphorous Load from New Community Farm/Allotments New Woodland New Woodland Area nitrogen Ioad Phosphorous Load from New Woodland Phosphorous Load from New Woodland

Combined nitrogen load from future land uses Combined phosphorous load from future land uses

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility form loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals					
Lowland Grazing Livestock					
Racetrack					
Hay Cut					
Other Grassland/Greenfield					
Mixed area - Urban					
Mixed area - Greenfield					
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B					

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)					
CSD9B (Urban)					
CSD9B (Other Grassland/greenfield)					
CSD9A (Urban)					
CSD9A (Other Grassland/greenfield)					

* Note all land use data is excluded because only extra DWF nutrient budget from OFMA is considered in this assessment

Stage 1 to Stage 3 Nutrient Loading Calcs Summary			
	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load	7490.6	104.0	
Stage 2 - existing agriculture landuse load			Land Use Fully Excluded
Stage 3 - proposed development landuse load			Land Use Fully Excluded
Stage 4 - Net Change in Nitrogen and Phosphorous Budge	t		
Stage 4 - Net Change in Nitrogen and Phosphorous Budge	t		
Stage 4 - Net Change in Nitrogen and Phosphorous Budge	TN (kgN/yr)	TP (kgP/yr)	
		TP (kgP/yr) 104.0	
Step 1 (Stage 1)	TN (kgN/yr)		
Stage 4 - Net Change in Nitrogen and Phosphorous Budge Step 1 (Stage 1) Step 2 (Stage 3 - Stage 2) Step 3 (Step 1 + Step 2)	TN (kgN/yr) 7490.6	104.0	
Step 1 (Stage 1) Step 2 (Stage 3 - Stage 2) Step 3 (Step 1 + Step 2)	TN (kgN/yr) 7490.6 0.0	104.0 0.0	
Step 1 (Stage 1) Step 2 (Stage 3 - Stage 2)	TN (kgN/yr) 7490.6 0.0 7490.6	104.0 0.0 104.0	

8988.7 124.8 Only extra DWF Nutrient Budget Included

trogen/Phosphorous Budget with 20% buffer

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Sce	enario 1)	PCC (Scenario 2)		
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)	
Severn Trent Connect - onsite WwTW	9811	136	8989		

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Sce	enario 1)	PCC (Sce	enario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (
Severn Trent Connect - onsite WwTW	10.5	11.4	9.7	

Assumed Wetland TN removal rate	93 g/m2/yr	930 kg/ha/yr
Assumed Wetland TP removal rate	1.2 g/m2/yr	12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

	125
	120
a (ha)	

10.4

8. Wetland Hydraulic Loading

Wetland Details Summary

	Wetland Area				
Wetland_ID (See Note 1)	(m2)	Wetland Area (ha)	Wetland Depth (m)	Treatment depth (m)	Comments
18/42	120120	12.01	0.50		Receives wastewater discharge. The total footprint of the wetland is 13.0ha but only 75% is taken as effective area (9.75ha) due to earth works required for cascade
W13	130129	13.01	0.50	0.25	wetland features.
W15	18400	1.84	0.50		Provides tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in OFMA. W7 and W15 are interlinked (Total area: 3.71 ha).
	148529	13.01			

Preliminary Hydraulic Loading Calcs For Wastewater Wetland (W13)

	Effective Wetland Area (m2) - See Note 4	Effective Wetland Depth (m)	Max Dry Weather Flow, DWF (m3/day)	Hydraulic Retention Time, HRT (days) - See note 5	Hydraulic Loading Rate, HRT (m/day) - See Note 5	The hydraule residence form (HTT) was calculated as follows HTT charac-	be dependent upon al., 2011). A high efflu residence time will insufficient contact tim
OPTION 1 - Assuming 50mm effective treatment depth	115997	0.05	3456.70	1.7	0.03	(utburste(m)/da)	removal of pollutants and HLRs of < 0.1 m
OPTION 2 - Assuming 150mm effective treatment depth	115997	0.15	3456.70	5.0	0.03	The hydraulic thading new HUR was calculated as follows:	al., 2015). Shallow w mended to increase t
OPTION 3 - Assuming 250mm effective treatment depth	115997	0.25	3456.70	8.4	0.03	HE (m (dar) = Median dar (m ² / dar) He lind surface area (m ²)	wetland sediment, w through good contact

Notes

1. Proposed Wetland locations are shown on Drawing No. 10029956-AUK-XX-XX-DR--CW-0041-P3 (Proposed Nutrient Mitigation Strategy) in Appendix F.

2. Proposed Surface Water Drainage Zones are shown on Drawing No. 10029956-AUK-XX-XX-DR--CW-0007-P7 (Surface Water Drainage Zones and Runoff Rates) in Appendix J.

Proposed Surface Water Drainage Strategy is shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0014-P4 (Surface Water Drainage Strategy Overview) in Appendix J.
 Total wetland area for W13 is 13.01ha but assumed 75% for effective wetland area and remaining 25% for creating bunds for cascade features (i.e. @ 1 in 20 existing ground slope).
 The above shows that HRT of > 5 days and HLR of < 0.1 m/day can be achieved with the proposed WwTW wetland W13 (Option 3 - 250mm effective treatment depth) and therefore meets the recommended wetland design guidance.

Hydraulic residence times and loading rates

Wetland nutrient removal efficiency is widely considered to pon both the HLR and the HRT (Dong et effluent loading rate coupled with a short will typically overload the ICW, giving t time for physical, chemical and biological ants. For this reason, HRTs of 5-30 days 1 m/day have been recommended (Wu et v water depths (-50 cm) are also recomise the contact time between effluent and t, whilst also keeping water oxygenated ntact with the atmosphere (Wu et al., 2015).

https://onlinelibrary.wiley.com/doi/epdf/10.1111/wej.12605

Onsite WwTW

Scenario 2 - WwTW Discharges Only Loading

2C - Otterpool NN (V1.8) - Onsite WwTW - OFMA & Sellindge DWF.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name Development name	Folkstone and Hythe DC Masterplan Framework (incl CSD9A & CSD9B)			
Development location (grid reference)		https://gridreferencefinder.com/		
Number of residential dwellings (Class C3)		OFMA + CSD9A & 9B Dwellings of	only	
Number of residential dwellings (Class C2)		OFMA + CSD9A & 9B Dwellings of		
Hotel Bedrooms (Class C1)	117	3	,	
Local Planning Authority	Folkstone and Hythe DC			
	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instead
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
o o o o		5	Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
		-		
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
			Environment Agency - this is	
			indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know	0.3	mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site		hectares		
New Urban Area		hectares		
Anne of design stad Ovidable Alternative Network Openary (OANO)/sees an end		h		
Area of designated Suitable Alternative Natural Space (SANG)/open space		hectares		
Area of Community Farm/Allotments		hectares		
Current land use				
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals		27.3	0.36	i
Lowland Grazing Livestock		12.2	0.24	
Racetrack				Average of urban & lowlan grazing livestock loss rates
		13.3	0.5	used.
Hay Cut		5	0.14	
Other Grassland/Greenfield		5	0.14	
Mixed area - Urban		14.3	0.83	5
Mixed area - Greenfield		5	0.14	•
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B		14.3	0.83	•

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

	Average Nutrient Loss Rate			
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr) Phosphorous (kg P/ha/yr)		
CSD9B (Cereals)		27.3	0.36	
CSD9B (Urban)		14.3	0.83	
CSD9B (Other Grassland/greenfield)		5	0.14	
CSD9A (Urban)		14.3	0.83	
CSD9A (Other Grassland/greenfield)		5	0.14	

* Note all land use data is excluded because only extra DWF nutrient budget from OFMA + CSD9A & 9B is considered in this assessment

2. Otterpool FM+CSD9A&B@110(S1)

New development nitrogen budget

Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development	Framework (incl CSD9A & CSD9B)		
Number of residential dwellings (Class C3)	9054	OFMA + CSD9A & 9B Dwellings only	
Number of residential dwellings (Class C2)		OFMA + CSD9A & 9B Dwellings only	
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate		Natural England recommendation	
Step 2 confirm water use (litres per person)	110	l/p/d Natural England recommendation - for resinential Class C1	
		Vp/d British Water recommendation - for residential Class C2 Vp/d British Water recommendation - for Hotel Class C1	No allowance included for Otterpool water efficiency measures No allowance include for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Onsite WwTW	I/p/d_British water recommendation - for Hotel Class C I	NA - This calculation is alternative for onsite WwTW option.
and permitted TN concentration	N/A	NAV	N/A - This calculation is alternative for onsite WwTW option.
Permitted Total Phosphate concentration	NA		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool	72	mg/I Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool	0.1	mg/l Severn Trent Connect	ST Connect's committed TP value. Onsite WwTW permit u/s outfall option.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.1	nigh Sevent Helit Connect	Si Connects committee i re value, onsite www.w permit urs outrali option.
exit the WwTW after treatment			
Additional population (Residential Class C3)	21729.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2)	3110.4	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3549096	litres/day	
Receiving WwTW environmental permit for TN		mg/I TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP		mg/I TP	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit	6.48	mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit		mg/I TP	
TN discharged after WwTW treatment TP discharged after WwTW treatment	22998142.08	mg/TN/day mg/TP/day	
Annual wastewater total nitrogen load			
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	8394.32	kq/TN/yr kg/TP/yr	
	110.00	(g, 17).	
Stage 2	Figures	Units/ Data source	Further information
Current land use	- garee		
Total area of existing "agricultural" and other land			
Total area of existing 'agricultural' and other land			
Total area of existing 'agricultural' and other land			
Total area of existing 'agricultural' and other land			
Total area of existing 'agricultural' and other land			
Total area of existing 'agricultural' and other land			
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Nitrate loss from current site land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area nitrogen load Nitrogen load from future urban area Phosphorous load from future urban area SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space nitrogen load	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area not hosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space phosphorous load SANG/open space	Figures	units/ Data source	Further information
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Disclaimer

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

able 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan

		Average Nutrient Loss Rate		Estimated Nutr	ient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals					
Lowland Grazing Livestock					
Racetrack					
Hay Cut					
Other Grassland/Greenfield					
Mixed area - Urban					
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield					
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B					

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Average Nutrient Loss Rate Estimated Nutrient loss		ient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)	
CSD9B (Cereals)						
CSD9B (Urban)						
CSD9B (Other Grassland/greenfield)						
CSD9A (Urban)						
CSD9A (Other Grassland/greenfield)						

* Note all land use data is excluded because only extra DWF nutrient budget from OFMA + CSD9A & 9B is considered in this assessment

Stage 1 to Stage 3 Nutrient Loading Calcs Summary			
	TN (kgN/yr)	TP (kgP/yr)	1
Stage 1 - WwTW load	8394.3	116.6	
Stage 2 - existing agriculture landuse load			Land Use Fully Excluded
Stage 3 - proposed development landuse load			Land Use Fully Excluded

Stage 4 - Net Change in Nitrogen and Phosphorous Budget

	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	8394.3	116.6
Step 2 (Stage 3 - Stage 2)	0.0	0.0
Step 3 (Step 1 + Step 2)	8394.3	116.6
Step 4 (= Step 3, i.e. N/P budget without buffer)	8394.3	116.6
Step 5 (Step 4*20%)	1678.9	23.3
Step 6 (Step 4 + Step 5)	10073.2	139.9
	10073.2	139.9

egen/Dheenhereus Budget with 20% huffer

3. Otterpool FM+CSD9A&B@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	Framework (incl CSD9A & CSD9B)		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	9054	OFMA + CSD9A & 9B Dwellings only OFMA + CSD9A & 9B Dwellings only	
Hotel Bedrooms (Class C1)	1250	OPMA + CODSA & SB Dwellings Only	
Local Planning Authority	Folkstone and Hythe DC		
Stage 1 Step 1 calculate additional population	Figures	Units/ Data source	Further information
Step 1 calculate additional population	24	Natural England recommendation	
Step 2 confirm water use (litres per person)	110	l/p/d Natural England recommendation - for resinential Class C1	
	262.5	l/p/d British Water recommendation - for residential Class C2 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
	225	l/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW) and permitted TN concentration	Onsite WwTW	NAV	N/A - This calculation is alternative for onsite WwTW option. N/A - This calculation is alternative for onsite WwTW option.
Permitted Total Phosphate concentration	N/A		N/A - This calculation is alternative for onsite WwTW option.
Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool	7.2	mg/I Severn Trent Connect	ST Connect's UCAS certified TN value
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.1	mg/l Severn Trent Connect	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
exit the WwTW after treatment			
Additional population (Residential Class C3)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2)	3110.4	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1) Wastewater volume generated by development		Persons litres/day	Assumed 2.0 Occupancy Rate/per room
Receiving WwTW environmental permit for TN	3259386	mg/I TN	ST Connect's UCAS certified TN value
Receiving WwTW environmental permit for TP	0.1	mg/I TP	ST Connect's committed TP value, Onsite WwTW permit u/s outfall option.
90% of the proposed consent TN limit		mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit TN discharged after WwTW treatment	0.09 21120821.28	mg/TP mg/TN/day	
TP discharged after WwTW treatment		mg/TP/day	
Annual wastewater total nitrogen load	7709.10	kg/TN/yr	
Annual wastewater total phosphorous load	107.07	kg/TP/yr	
Stage 2	Figures	Units/ Data source	Further information
Current land use			
Total area of existing 'agricultural' and other land			
Total alog of outsting agricultural and outor land			
rown wrow on onlotting agricultural and outor land			
, our oco o osseny egironiure and orionen			
Nitrate loss from current site land use			
Nitrate loss from current site land use Phosphate loss from current site land use			
Nitrate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current land use			
Nitrate loss from current site land use Phosphate loss from current site land use			
Nitrate loss from current site land use Phosphate loss from current site land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total Intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrocen load Urban area hosphate bad Nitrogen load from future urban area Phosphorous load from future urban area	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New uthan area nitrogen laad Urban area nitrogen laad Urban area nitrogen laad Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area SANG/open space SANG/open space phosphorous load	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New uthan area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area SANG/open space SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 Wrogen area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area Phosphorous load from SANGopen space SANG/open space Phosphorous load from SANG/open space Phosphorous Load fro	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hitrogen load Urban area hitrogen load Urban area hitrogen load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space New Community Farm/Aldurents area New Community Farm/Aldurents area	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 Wer urban area Urban area hitroqen load Urban area phosphate load Nitroqen load from future urban area Phosphorous load from SANGopen space SANG/open space SANG/open space SANG/open space SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space New Community Fami/Aldotments area New Community Fami/Aldotments phosphorous load	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hitroqen load Urban area hitroqen load Urban area hitroqen load Urban area hitroqen load Urban area hitroqen load Nitroqen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space hitoden load SANG/open space hitoden load Nitroqen Load from SANG/open space New Community Fami/Alditments Andersen load Nitroqen Load from Community Fami/Alditments	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area nitrogen load Urban area nitrogen load Hitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area SANG/open space SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space New Community Famr/Aldments area New Community Famr/Aldments nitrogen load Nitrogen Load from Community Famr/Aldments Phosphorous Load from Community Famr/Aldments Phosphorous Load from Community Famr/Aldments Nitrogen Load from Community Famr/Aldments	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total Initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hitrogen load Urban area hitrogen load Urban area hitrogen load Urban area hitrogen load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space hitoden load SANG/open space hitoden load SANG/open space hitoden load SANG/open space new SANG/open space Phosphorous Load from SANG/open space New Community Famt/Altornents Ander New Community Famt/Altornents phosphorous load Nitrogen Load from New Community Famt/Altornents Phosphorous Load from Ace nitrogen load	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorus load from future urban area Phosphorus load from future urban area New SANG/open space SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorus Load from SANG/open space New Community Famr/Aldotments area New Community Famr/Aldotments phosphorous load Nitrogen Load from Community Famr/Aldotments Phosphorus Load from Community Famr/Aldotments Phosphorus Load from New Community Famr/Aldotments PhoseWoodlan Area phosphorus load	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hitrogen load Urban area hitrogen load Urban area hitrogen load Urban area hitrogen load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space hitoden load SANG/open space hitrogen load Nitrogen Load from SANG/open space New Community Farm/Aldotments phosphorous load Nitrogen Load from Community Farm/Aldotments Phosphorous Load from New Community Farm/Aldotments New Woodiand Area nitrogen load	Figures	units/ Data source	Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total nitrate loss from current land use Stage 3 New urban area Urban area hitrogen load Urban area hitrogen load Urban area hitrogen load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitoden load SANG/open space nitoden load Nitrogen Load from SANG/open space New Community Fami/Aldements area New Community Fami/Aldements phosphorous load Nitrogen Load from New Community Fami/Allotments Phosphorus Load from New Community Fami/Allotments New Woodiand Area nitrogen load New Woodiand	Figures	units/ Data source	Further information
Nitrate loss from current site land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hittogen load Urban area hittogen load Urban area hittogen load Nitrogen load from future urban area New SANG/open space SANG/open space SANG/open space SANG/open space SANG/open space SANG/open space Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space New Community Famt/Aldments Area New Condind Area nitrogen load New Woodiand Area nitrogen load New Woodiand Area nitrogen load New Woodiand Area nitrogen load	Figures	units/ Data source	Further information

Disclaimer

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Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss R	ate	Estimated Nutri	ient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals					
Lowland Grazing Livestock Racetrack					
Racetrack					
Hay Cut					
Other Grassland/Greenfield					
Mixed area - Urban					
Mixed area - Greenfield					
Other Grassland/Greenfield Other Grassland/Greenfield Mixed area - Urban Moxed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B					

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss R	ate	Estimated Nutr	lient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)					
CSD9B (Urban)					
CSD9B (Other Grassland/greenfield)					
CSD9A (Urban)					
CSD9A (Other Grassland/greenfield)					

* Note all land use data is excluded because only extra DWF nutrient budget from OFMA + CSD9A & 9B is considered in this assessment

Stage 1 to Stage 3 Nutrient Loading Calcs Summary			
	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load	7709.1	107.1	Land Use Fully Excluded
Stage 2 - existing agriculture landuse load			Land Use Fully Excluded
Stage 3 - proposed development landuse load			
			-
Stage 4 - Net Change in Nitrogen and Phosphorous Budget			
	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	7709.1	107.1	
Step 2 (Stage 3 - Stage 2)	0.0	0.0	
Step 3 (Step 1 + Step 2)	7709.1	107.1	
Step 4 (= Step 3, i.e. N/P budget without buffer)	7709.1	107.1	
Step 5 (Step 4*20%)	1541.8	21.4	
Step 6 (Step 4 + Step 5)	9250.9	128.5	
			Only extra DWF Nutrient Budget Included
	9250.9	128.5	

itrogen/Phosphorous Budget with 20% buffer

4. Nutrient Mitig Rquir Summary

930 kg/ha/yr

12 kg/ha/yr

Nutrient Budget Summary

	PCC (Sce	nario 1)	PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Severn Trent Connect - onsite WwTW	10073	140	9251	128

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Sce	enario 1)	PCC (Sce	enario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Severn Trent Connect - onsite WwTW	10.8	11.7	9.9	10.7

Assumed Wetland TN removal rat	е
Assumed Wetland TP removal rat	е

93 g/m2/yr 1.2 g/m2/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

8. Wetland Hydraulic Loading

Wetland Details Summary

	Wetland Area				
Wetland_ID (See Note 1)	(m2)	Wetland Area (ha)	Wetland Depth (m)	Treatment depth (m)	Comments
W13	130129	13.01	0.50		Receives wastewater discharge. The total footprint of the wetland is 13.0ha but only 75% is taken as effective area (9.75ha) due to earth works required for cascade wetland features.
W15	18400	1.84	0.50		Provides tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in OFMA. W7 and W15 are interlinked (Total area: 3.71 ha).
	148529	13.01			

Preliminary Hydraulic Loading Calcs For Wastewater Wetland (W13)

	Effective Wetland Area (m2) - See Note 4	Effective Wetland Depth (m)	Max Dry Weather Flow, DWF (m3/day)	Hydraulic Retention Time, HRT (days) - See note 5	Hydraulic Loading Rate, HRT (m/day) - See Note 5
OPTION 1 - Assuming 50mm effective treatment depth	115997	0.05	3549.10	1.6	0.03
OPTION 2 - Assuming 150mm effective treatment depth	115997	0.15	3549.10	4.9	0.03
OPTION 3 - Assuming 250mm effective treatment depth	115997	0.25	3549.10	8.2	0.03

The hydraulic residence (me (HRT) was calculated as follows

$$\label{eq:hermited} \begin{split} \text{HFI}\left(\text{days}\right) &= \frac{\text{Wetland volume}\left(m^2\right)}{\text{Outflow rate}\left(m^2/\text{day}\right)} \end{split}$$

The hydraulic loading rate (HLR) was calculated as follows:

 $HER(m/day) = \frac{Inflow rate (m^2/day)}{Wetland surface area (m^2)}$

1. Proposed Wetland locations are shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0041-P3 (Proposed Nutrient Mitigation Strategy) in Appendix F.

2. Proposed Surface Water Drainage Zones are shown on Drawing No. 10029956-AUK-XX-XX-DR--CW-0007-P7 (Surface Water Drainage Zones and Runoff Rates) in Appendix J.

3. Proposed Surface Water Drainage Strategy is shown on Drawing No. 10029956-AUK-XX-XX-DR-CW-0014-P4 (Surface Water Drainage Strategy Overview) in Appendix J.

4. Total wetland area for W13 is 13.01ha but assumed 75% for effective wetland area and remaining 25% for creating bunds for cascade features (i.e. @ 1 in 20 existing ground slope).

5. The above shows that HRT of > 5 days and HLR of < 0.1 m/day can be achieved with the proposed WwTW wetland W13 (Option 3 - 250mm effective treatment depth) and therefore meets the recommended wetland design guidance.

Hydraulic residence times and loading rates

Wetland nutrient removal efficiency is widely considered to be dependent upon both the HLR and the HRT (Dong et *al.*, 2011). A high effluent loading rate coupled with a short residence time will typically overload the ICW, giving insufficient contact time for physical, chemical and biological removal of pollutants. For this reason, HRTs of 5-30 days and HLRs of < 0.1 m/day have been recommended (Wu et *al.*, 2015). Shallow water depths (<50 cm) are also recommended to increase the contact time between effluent and wetland sediment, whilst also keeping water oxygenated through good contact with the atmosphere (Wu et *al.*, 2015).

https://onlinelibrary.wiley.com/doi/epdf/10.1111/wej.12605

Onsite WwTW

Scenario 3 - Land Use Discharges Only Loading

3A - Otterpool NN (V1.8) - Onsite WwTW - Tier 1 OPA Land Use.xlsx

1. Input Data

0.14

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC	
	Otterpool Park Garden Town - Tier	
Development name	1 OPA Only	
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/
Number of residential dwellings (Class C3)		Dwellings DWF Excluded
Number of residential dwellings (Class C2)		Dwellings DWF Excluded
Hotel Bedrooms (Class C1)		Dwellings DWF Excluded
Local Planning Authority	Folkstone and Hythe DC	
	-	

	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instead
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)) N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
		-	Environment Agency - this is	
			indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know			accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site	589.0	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
New Urban Area	317.9	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of designated Suitable Alternative Natural Space (SANG)/open space	179.49	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
			Based on the habitat survey info	
			presented in the previous OP	
			Outline Planning Application in	
			2019. consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved		Land Type Tab	
	grassland & species poor semi-	•		
	improved grassland (see the			
Current land use	breakdown in Table 1 below			
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool OPA)				
			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	5
Lowland Grazing Livestock	119.1	12.2	0.24	•
				Average of urban & lowland grazing livestock loss rates
Racetrack	13.6			grazing livestock loss rates
		13.3	0.5	used.
Hay Cut	18.9	5	0.14	•
Other Grassland/Greenfield	69.7	5	0.14	-
Mixed area - Urban	11.5	14.3	0.83	3
Mixed area - Greenfield	4.5	5	0.14	•
	562.2			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Other excluded existing retained land within Otterpool OPA (e.g.	
vegetation/buildings/ waterbodies/ecological features/roads)	26.8

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)
CSD9B (Cereals)		27.3	0.36
CSD9B (Urban)		14.3	0.83
CSD9B (Other Grassland/greenfield)		5	0.14
CSD9A (Urban)		14.3	0.83
CSD9A (Other Grassland/greenfield)		5	0.14

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only Tier 1 OPA Land use is included).

2. Otterpool FM@110(S1)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Tier 1 OPA		
Development	Only		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)		Dwellings DWF Excluded Dwellings DWF Excluded	
Hotel Bedrooms (Class C1)		Dwellings DWF Excluded	
Local Planning Authority	Folkstone and Hythe DC		
Store 4		Halfed Data account	Footback information
Stage 1 Step 1 calculate additional population	Figures	Units/ Data source	Further information
Occupancy rate			
Step 2 confirm water use (litres per person)			
Step 3 confirm Waste water Treatment Works (WwTW)			
and permitted TN concentration			
Permitted Total Phosphate concentration			
Proposed permitted Total Nitrogen concentration to accommodate Otterpool			
Proposed permitted Total Phosphate concentration to accommodate Otterpool			
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment			
Additional population (Residential Class C3) Additional population (Residential Class C2)			
Additional population (Residential Class C2) Additional population (Hotel Class C1)			
Wastewater volume generated by development			
Receiving WwTW environmental permit for TN Receiving WwTW environmental permit for TP			
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit			
90% of the proposed consent TP limit			
TN discharged after WwTW treatment			
TP discharged after WwTW treatment Annual wastewater total nitrogen load			
Annual wastewater total hirogen load			
			·
Stage 2	Figures	Units/ Data source Ecology Survey report reference/remote imagery	Further information
	A mixture of arable land (i.e. Cereals/Lowland	Ecology Survey report relevencementore imagery	
	Grazing Livestock), Hay Cut, Mixed and Other		
	Grassland (see the breakdown in Table 2 below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey info		
	presented in the previous OP Outline Planning		
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
			Sellinoge CSD9A & CSD9B Sites included separately based on available data .
			Sellingge CSUSA & CSUSE Sites included separately based on available data .
Total area of existing 'agricultural' and other land	562.2	hectares	Seiinoge CSU9A & CSU9B Sites included separately based on available data . See Table 24/2B & Input Data Tab
Total area of existing 'agricultural' and other land	562.2	hectares	
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Total area of existing 'agricultural' and other land	562.2	hectares	
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Total area of existing 'agricultural' and other land	562.2 See Table 2A/2B	hectares kgN/halyr	
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Nitrate loss from current site land use	See Table 24/2B See Table 24/2B 11132 94	kgN/halyr knP/nalyr knNor	See Table 24/28 & Input Data Tab
Nitrate loss from current site land use	See Table 24/28	kgN/halyr knP/nalyr knNor	See Table 24/28 & Input Data Tab
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Nitrate loss from current sile land use Phosphate loss from current sile land use Total initiate loss from current land use Cale Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area solosahete load	See Table 24/28 See Table 24/28 11132,94 175,40 Figures 143, 0,83	kgNihalyr knPihalyr kgNyr kgPyr hetnesddia layout kgNhalyr kgNhalyr	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B Further information
Nitrate loss from current site land use Phosphate loss from current land use Totai nitrate loss from current land use Totai Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load	See Table 2A/2B See Table 2A/2B 11132.94 175.40 Figures 317.9 14.3	kgNihalyr knPihalyr kgNyr kgPyr hetnesddia layout kgNhalyr kgNhalyr	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B Further information
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Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Uthan area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGCopen space SANGCopen space	See Table 2A/2B See Table 2A/2B 11132.94 175.40 Figures 317.90 4.3 4546.11 203.87 1705.5 5	kgNihaiyr kgNiyr kgNyr kgPyr hectaresiste layout kgPihaiyr kgPihaiyr kgNiyr kgPiyr ha	See Table 2A/2B & Input Data Tab See Table 2A/2B & See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed militation areas (i.e. Wetland & Woodland areas). See Input
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Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area New SaNGopen Isoat Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGopen space SANGopen space SANGopen space SANGopen space New Community FamilAlitoments infragen load New Community FamilAlitoments shoaphorous load New Community FamilAlitoments Shoaphorous load New Community FamilAlitoments	See Table 2A/2B See Table 2A/2B 11132 94 Figures 175.40 Figures 175.40 263.87 179.5 0.5 0.5 0.5 0.5 0.5 0.22 0.22 0.22 0.	kgNiha'yr knPiha'yr kgNyr kgPyr hechredylle leycut kgNayr kgNayr kgNayr ha ha ha ha ha ha ha ha ha ha ha ha ha	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B See Table 2A/2B See Table 2A/2B Excluded proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space phosphorous load Nitrogen Load from SANG/open space New Community Farm/Aldimentis area New Community Farm/Aldimentis Area New Community Farm/Aldimentis area	See Table 24/28 See Table 24/28 111132.94 Figures 317.9 14.3 0.83 4566.11 263.87 178.5 5 0.14 887.45 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.2 2.2	kgNihalyr kgPlyr kgPlyr hccares/sile layout kgPhayr kgPhayr kgNyr kgPlyr ha kgPhayr kgPlyr ha kgPhayr kgPhyr ha kgPhayr kgPhyr ha kgPhayr kgPhyr ha kgPhayr kgPhyr ha kgPhayr kgPhyr halyr kgPhyr halyr kgPhyr halyr kgPhyr halyr kgPhyr halyr kgPhyr halyr kgPhyr halyr kgPhyr haly	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Were urban area Urban area nitrogen load Urban area nitrogen load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space phosphorous load SANG/open space phosphorous load SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space New Community Farm/Aldiments area New Community Farm/Aldiments New Community Farm/Aldiments	See Table 2A/2B See Table 2A/2B 11132.94 175.40 Figures 415.80 4546.11 283.87 4546.11 283.87 5 0.14 88,87.45 251.3 8.8 22.5 0.28 23.2 2.2 24.2 25.3 3 8.8 22.5 3 2.8 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9	kgNhalyr knP/halyr kgPlyr units/ Data source hectares/site layout kgNalyr kgNyr kgPlyr kgPlyr ha kgPhayr kgPlyr ha kgNhalyr kgPlyr ha kgPhayr kgPlyr ha kgNralyr kgPlyr ha	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B See Table 2A/2B See Table 2A/2B Excluded proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
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Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Nitrogen load Urban area Nother area Urban area Nother area Urban area Nother area New SANGlopen space SANGlopen space Integration load SANGlopen space Phosphorous load Nitrogen Load from SANGlopen space SANGlopen space Nother area New Community Farmi/Aldiments New Woodland Area phosphorous load New Woodland Area phosphorous load New Woodland Area phosphorous load New Woodland Memory New Yoodland New Woodland Memory New Yoodland New Woodland Memory New Yoodland	See Table 24/28 See Table 24/28 111132 44 175.40 Figures 14132 44 175.40 1432 176.5 1433 4546.11 263.87 170.5 5 0.14 897.45 0.14 897.45 0.25 0.24 20.7 0.25 0.	kgNhaiyr kgNyr ingNyr becnesidiae layout kgPhayr kgNyr kgNyr kgNyr kgNyr kgNyr ha kgNaiyr kgNajr kgNajr kgNajr kgNajr kgNajr kgNajr kgNajr kgNajr kgNajr	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.

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Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool OPA)

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool OPA)					
		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	122	0.24	1453.02	28.58
Racetrack	13.6	13.25	0.535	180.20	7.28
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	69.7	5	0.14	348.50	9.76
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
0	0	0	0	0.00	0.00
	562.2			11132.94	175.40

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
* Note that Sellindge Sites are not applicapable for this calcula	tion sheet purpose (i.e. only OPA is included).				

Stage 1 to Stage 3 Nutrient Loading Calcs Summary				
	TN (kgN/yr)	TP (kgP/yr)		
Stage 1 - WwTW load			WWTW DWF Excluded	
Stage 2 - existing agriculture landuse load	11132.9	175.4		
Stage 3 - proposed development landuse load	5848.9	292.4	1	

Stage 4 - Net Change in Nitrogen and Phosphorous Budget		
	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	0.0	0.0
Step 2 (Stage 3 - Stage 2)	-5284.1	117.0
Step 3 (Step 1 + Step 2)	-5284.1	117.0
Step 4 (= Step 3, i.e. N/P budget without buffer)	-5284.1	117.0
Step 5 (Step 4*20%)	-1056.8	23.4
Step 6 (Step 4 + Step 5)	-6340.9	140.4
	-6340.9	140.4

aen/Phosphorous Rudget with 20% huffer

3. Otterpool FM@110(S2)

ationated Nutries

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	ark Garden Town - Tier 1 OPA Only	Dwellings DWF Excluded	
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)		Dwellings DWF Excluded Dwellings DWF Excluded	
Hotel Bedrooms (Class C1)		Dwellings DWF Excluded	
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population Occupancy rate			
Step 2 confirm water use (litres per person)			
Step 2 commit water use (intes per person)			
Step 3 confirm Waste water Treatment Works (WwTW)			
and permitted TN concentration			
Permitted Total Phosphate concentration			
Proposed permitted Total Nitrogen concentration to accommodate Otterpool			
Proposed permitted Total Phosphate concentration to accommodate Otterpool			
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment			
Additional population (Residential Class C3)			
Additional population (Residential Class C2)			
Additional population (Hotel Class C1)			
Wastewater volume generated by development Receiving WwTW environmental permit for TN			
Receiving WWTW environmental permit for TN Receiving WwTW environmental permit for TP			
90% of the proposed consent TN limit			
90% of the proposed consent TP limit			
TN discharged after WwTW treatment			
TP discharged after WwTW treatment Annual wastewater total nitrogen load			
Annual wastewater total hitrogen load			
Stage 2	Figures	Units/ Data source	Further information
	A mixture of arable land (i.e.	Ecology Survey report reference/remote imagery	
	Cereals/Lowland Grazing		
	Livestock), Hay Cut, Mixed and Other Grassland (see the		
	breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this		
	largely based on the habitat survey		
	info presented in the previous OP		
Current land use	Outline Planning Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	562.2	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	koN/ha/vr	
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/vr	
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B 11132.94	knP/ha/yr knNyr	See Table 2A/2B
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use	See Table 2A/2B 11132.94 175.40	knP/halyr kgNlyr kgPlyr	See Table 2A/2B See Table 2A/2B
Total nitrate loss from current land use Total Phosphate loss from current land use	11132.94 175.40	kgN/yr kgP/yr	See Table 2A/2B
Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3	11132.94 175.40 Figures	kgNiyr kgPlyr units/ Data source	See Table 24/2B Further information
Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load	11132.94 175.40 Figures 317.9 14.3	kgNyr kgPlyr units' Data source hoctares/site layout kgNha/r	See Table 2A/2B
Total initiale loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	11132.94 175.40 Figures 317.9 14.3 0.83	kgNyr kgPlyr units/ Data source hectares/site layout kgNha/r kgPha/r	See Table 2A/2B Further information
Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load	11132.94 175.40 Figures 317.9 14.3	kgNyr kgPlyr units/ Data source hectares/site layout kgNha/r kgPha/r	See Table 2A/2B Further information
Total initiale loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	11132.94 175.40 Figures 317.9 14.3 0.83	kgNyr kgPlyr units/ Data source hectares/site layout kgNha/r kgPha/r	See Table 2A/2B Further information
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitogen load Urban area phosphate load Nitogen load from future urban area	11132.94 175.40 Figures 317.9 14.3 0.63 4546.11	kgNyr kgPjyr units' Data source hectares/sile layout kgP/halyr kgP/halyr	See Table 24/2B Further information
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hittogen load Urban area hosphate load	11132.94 175.40 Figures 317.9 14.3 0.83	kgNyr kgPjyr units' Data source hectares/sile layout kgP/halyr kgP/halyr	See Table 2A/2B Further information See Proposed Land Use Tab
Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area	11132.44 175.40 Figures 317.9 14.3 0.63 4546.11 263.87	kgNyr kgPjyr hectares/sile layout kgPhalyr kgPhalyr kgPlyr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
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Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area initogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space	111132.94 175.40 Figures 14.3 0.83 4546.11 203.87 179.5 5 5	kgNyr kgPjyr units/ Data source hectares/sile layout kgP/halyr kgP/yr kgP/yr ha	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
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Total intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area New SANGlopen space SANGlopen space intragen load SANGlopen space nitrogen load SANGlopen space SANGlopen Space	111132.94 175.40 Figures 317.9 44.3 4566.10 203.87 203.87 5 5 5 8 8 87.45 251.33 8.8 23.5 23.5 23.5 23.5 23.5 23.5 23.5 23.5	kgNyr kgPlyr units/ Deta source hectares/site layout kgPhayr kgPhyr kgPyr ha kgNyayr kgPyr ha kgNyr kgPyr ha	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Total intrate loss from current land use Total Phosphale loss from current land use Stage 3 New urban area Urban area intogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area SANG/open space entrogen load SANG/open space entrogen load SANG/open space phosphorous load Nitrogen - Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space New Community Farm/Aldments area	111132.94 175.40 Figures 317.9 44.3 0.83 4546.11 283.87 170.5 5 5 0.14 807.45 25.13 9.84 22.5 2.25 2.25 2.25	kgNyr units/ Data source hectares/site layout kgP/halyr kgP/kgYr kgP/kgr ha kgP/kgr ha ha hab kgP/kgr hab hab kgNyr kgP/kgr hab	See Table 24/28 Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tat and Proposed Land Use Tab for details.
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Total initiate loss form current land use Total Phosphale loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area SANG/open space phosphorous load SANG/open space phosphorous load SANG/open space phosphorous load SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space New Community Farm/Allotments New Community Farm/Allotments New Community Farm/Allotments New Community Farm/Allotments New Community Farm/Allotments New Community Farm/Allotments New Woodland Area nitrogen load	111132.94 175.40 Figures 317.9 0.83 4546.11 283.87 179.5 5 5 5 5 5 5 0.14 80745 263.87 0.14 80745 25.13 9.88 22.5 0.28 22.30.30 2.274 35 5 5 5 5 5 5 5 5 2.23 30 2.24 2.45 2.23 30 2.24 2.55 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	kgNyr hectares/site layout kgPlyr kgP/ma/r kgP/yr kgP/yr ha kgP/yr ha ha kgNyr kgP/yr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr ha ha kgNyr kgPyr kgPyr ha ha kgNyr kgPyr kg	See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Total intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitogen load Urban area phosphate load Nitogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitogen load SANGlopen space nitogen load New Community FamilAlitements New Community FamilAlitements New Community FamilAlitements Phosphorous Load from New Community FamilAlitements New Woodland Area phosphorous load	111132.94 175.40 Figures 317.9 0.83 0.83 4566.11 263.87 5 0.14 887.45 0.14 887.45 2.513 0.14 887.45 2.513 0.14 887.45 2.513 0.22 2.030 2.24 3.55 5 5 0.02	kgNyr units/ Data source hectares/site layout kgDhayr kgDyr kgDyr ha kgDhayr kgDhayr kgDhayr kgDhayr kgDhayr kgDhayr kgDhayr kgDhayr kgDhayr kgDrayr kgDrayr kgDrayr kgDrayr kgDrayr kgDyr ha kgDrayr kgDrayr >kgDyr kgDrayr	See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
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Total intrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitogen load Urban area phosphate load Nitogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitogen load SANGlopen space nitogen load New Community FamilAlitements New Community FamilAlitements New Community FamilAlitements Phosphorous Load from New Community FamilAlitements New Woodland Area phosphorous load	111132.4 175.40 Figures 317.9 44.3 456.11 2263.87 5 0.14 2263.87 5 0.14 2263.87 456.11 2263.11 2265.11 2265.11 2265.11 2265.11 2265.	kgNyr units/ Data source hectares/site layout kgDhayr kgDhyr ha kgDhayr kgDhayr kgDhyr ha kgDhayr kgDhayr kgDhyr ha kgDhayr kgDhayr kgDrayr kgDrayr kgDrayr kgDrayr kgDyr ha kgDrayr kgDrayr >kgDyr	See Table 2A/28 Further information See Proposed Land Use Tab Excluded proposed Initigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
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Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool OPA)

		Average Nutrient Loss Rate		Estimated Nutri	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.6	13.25	0.535	180.20	7.28
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	69.7	5	0.14	348.50	9.76
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
0	0	0	0	0.00	0.00
	562.2			11132.94	175.40

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
					1
	0.0			0.00	0.00
* Note that Sellindge Sites are not applicapable for this calcula	Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OPA is included).				

Hote that commage once are not approaphile for this calculation sheet purpose (not only of p

Stage 1 to Stage 3 Nutrient Loading Gales Summary					
	TN (kgN/yr)	TP (kgP/yr)			
Stage 1 - WwTW load			WWTW DWF Excluded		
Stage 2 - existing agriculture landuse load	11132.9	175.4			
Stage 3 - proposed development landuse load	5848.9	292.4			

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	0.0	0.0	
Step 2 (Stage 3 - Stage 2)	-5284.1	117.0	
Step 3 (Step 1 + Step 2)	-5284.1	117.0	
Step 4 (= Step 3, i.e. N/P budget without buffer)	-5284.1	117.0	
Step 5 (Step 4*20%)	-1056.8	23.4	
Step 6 (Step 4 + Step 5)	-6340.9	140.4	
	-6340.9	140.4	Only Land Use Nutrient Budget Included

itrogen/Phosphorous Budget with 20% buffer

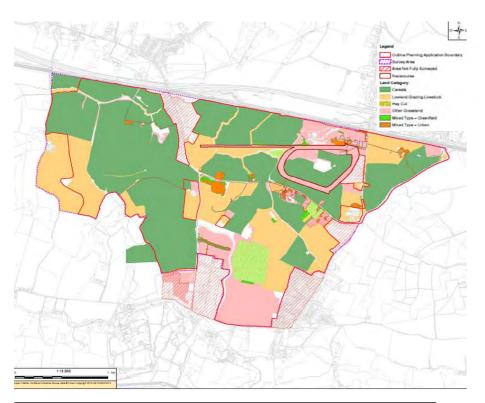
4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)	
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)	
Severn Trent Connect - onsite WwTW	-6341	140	-6341	140	
Nutrient Mitigation - Wetland Area Requirement Summary					

	PCC (Scenario 1)		PCC (Scenario 2)		
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)	
Severn Trent Connect - onsite WwTW	-6.8	11.7	-6.8	1	11.7
Assumed Wetland TN removal rate Assumed Wetland TP removal rate		g/m2/yr g/m2/yr		kg/ha/yr kg/ha/yr	

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d



Existing Land Type Area Statement within Outline Planning Application Boundary					
Land Category Area in Mt Area in Ha					
Cereals	3189561.4	319.0	1		
Lowland Grazing Livestock	1191257.8	119.1	1		
Racetrack	135944.9	13.6	1		
Hay Cut	188948.6	18.9	1		
Other Grassland	682491.8	68.2	Racetrack are		
Mixed Type - Urban	114712.8	11.5	1		
Mixed Type - Greenfield	45277.5	4.5	1		
	5548194.8	554.8			

Racetrack area deducted from "Other Grassland" area

Extra Existing Land Type Area Statement in recently extended OPA boundary @ NW Corner					
Land Category	Area in Mt	Area in Ha			
Cereals	59053.0	5.9			
Other Grassland		1.5			
	59053.0	7.4			
		Area in Ha			
Other existing retained land within Otterpool OPA (e.g. roads)		10.0			
Other existing retained land within Otterpool OPA (e.g. vegetation/buildings/ waterbodies/ecological features)		16.8			
		26.8			

Outline Planning Application Boundary

Existing Land Type Area Statement For CSD9A & CSD9B

Land Type	Area in Ha
CSD9B (Cereals)	17.16
CSD9B (Urban)	0.7
CSD9B (Other Grassland/greenfield)	1.05
CSD9A (Urban)	0.08
CSD9A (Other Grassland/greenfield)	8.98
	27.07

Note: Existing landuse data for CSD9A and CSD9B is currently taken from FHDC Stodmarsh Nutrient Budget (dated 21/09/2020) without GIS measurement although Arcadis undertaken a quick sense check by comparing with Google Areal images to validate this info.

Area in Ha 589.0

5. Existing Land Type Data

7. Proposed Land Use

	Area (ha)
Total Urban in OPA	317.9
Total Landscape open space in OPA	271.09
Exisiting community in framework masterplan area	
Retained farmland in framework masterplan area	
Existing Road	
Total OP Framework Area	589.00

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A					
Sellindge CSD9B					
CSD9A & 9B TOTAL	0	0.00	0		0

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OPA is included).

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS -	OTTERPOOL OPA	
	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	0.0	
Retained farmland in framework masterplan area	0.0	
Existing Roads		
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	16.8
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	179.49	
Total Urban Area in Framework Masterplan	317.9	
Total OP Framework Area Check	589.0	

 $\ensuremath{^*}\xspace{note}$ hote leachate loads from woodland is calculated separately instead of SANG leachate rates.

Onsite WwTW

Scenario 3 - Land Use Discharges Only Loading

3B - Otterpool NN (V1.8) - Onsite WwTW - OFMA Land Use.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC			
	Otterpool Park Garden Town -			
Development name	Masterplan Framework Only			
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/		
Number of residential dwellings (Class C3)		Dwellings DWF Excluded		
Number of residential dwellings (Class C2)		Dwellings DWF Excluded		
Hotel Bedrooms (Class C1)		Dwellings DWF Excluded		
Local Planning Authority	Folkstone and Hythe DC	Dwellings DWT Excluded		
Local Flamming Additionay				
	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works	Units	Southern Water	Not Used in this Calcs as onsite WwTW is used instead
			Southern water	NOT USED IN THIS CALCS AS ONSILE WWITWIS USED INSIEAU
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
1 3 , , , ,		5		
			Not evallable at present from the	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
			Environment Agency - this is	
			indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know	0.3	mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site		hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
	100.1	nootaroo	Cool Toposod Land Cool Tab	
New Urban Area	050 5	h t	Care Dave and the dillar Tab	Ottom and Dark FND Only
New Urban Area	350.5	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of designated Suitable Alternative Natural Space (SANG)/open space	183.60	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
	100.00	nootaroo	Cool Toposod Land Cool Tab	
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
	0.0		Based on the habitat survey info	
			presented in the previous OP	
			Outline Planning Application in	
			2019, consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved			
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below			
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	
Lowland Grazing Livestock	119.1	12.2	0.24	
Racetrack	13.5	13.3		Average of urban & lowland grazing livestock loss rates used.
Hay Cut	18.9	5	0.14	
Other Grassland/Greenfield	101.1	5	0.14	
Mixed area - Urban	11.5	14.3	0.83	
Mixed area - Greenfield	4.5	5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
CSD9B (Cereals)		27.3	0.36	
CSD9B (Urban)		14.3	0.83	
CSD9B (Other Grassland/greenfield)		5	0.14	
CSD9A (Urban)		14.3	0.83	
CSD9A (Other Grassland/greenfield)		5	0.14	
	0.00			

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA Land use is included).

2. Otterpool FM@110(S1)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development	Framework Only	Dwellings DWF Excluded	
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1)		Dwellings DWF Excluded	
Hotel Bedrooms (Class C1) Local Planning Authority	Folkstone and Hythe DC	Dwellings DWF Excluded	
	Poikstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population Occupancy rate			
Step 2 confirm water use (litres per person)			
Step 3 confirm Waste water Treatment Works (WwTW)			
and permitted TN concentration			
Step 3 confirm Waste water Treatment Works (WwTW) and permitted TA concentration Permitted Total Phosphate concentration Proposed permitted Total Nitrogen concentration to accommodate Otterpool			
Otterpool			
Proposed permitted Total Phosphate concentration to			
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment Additional population (Residential Class C3)			
Proposed permitted Total Phosphate concentration to accommodate Oterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would eat the WVTW hater treatment Additional population (Residential Class C3) Additional population (Residential Class C2) Additional population (Residential Class C2) Additional population (Residential Class C1) Waterweater Volume generated by Aevelopment			
Additional population (Hotel Class C1)			
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit			
90% of the proposed consent TP limit			
TN discharged after WwTW treatment TP discharged after WwTW treatment			
Annual wastewater total nitrogen load Annual wastewater total phosphorous load			
Annual wastewater total phosphorous load			
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland Grazing Livestock), Hay Cut, Mixed and Other		
	Grassland (see the breakdown in Table 2		
	below and 'Land Type Overview' Tab) - this largely based on the habitat survey info		
	presented in the previous OP Outline Planning Application in 2019.		
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
		beclares	See Table 24/2B & Innut Data Tab
Total area of existing 'agricultural' and other land	613.4	nectares	See Table 24/28 & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B	knP/ha/yr	See Table 2A/2B
Total Phosphate loss from current land use	11573.19 196.26	kgP/yr	See Table 24/28 See Table 24/28
Stage 3	Figures	units/ Data source	Further information
New urban area	350.5	hectares/site layout	See Proposed Land Use Tab
Urban area nitrogen load Urban area phosphate load	14.3	kgN/ha/yr kgP/ha/yr	
Nitrogen load from future urban area	5012.15	kgN/yr	
-			
Phosphorous load from future urban area	290.92	kgP/yr	Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input
New SANG/open space	183.6	ha	Data Tab and Proposed Land Use Tab for details.
SANG/open space nitrogen load SANG/open space phosphorous load	5	kgN/ha/yr kgP/ha/yr	
Nitrogen Load from SANG/open space	918	kgN/yr	
Phosphorous Load from SANG/open space New Community Farm/Allotments area	25.70 9.8	kgP/yr	See Input Data Tab and Proposed Land Use Tab for details.
New Community Farm/Allotments nitrogen load	23.5	kgN/ha/yr	oss mpor solidi rab anu ritopuedu canu USB Tabi tul UBIdits.
New Community Farm/Allotments phosphorous load Nitrogen Load from Community Farm/Allotments	0.28	kgP/hal⁄yr kgN/yr	
Phosphorous Load from New Community Farm/Allotments		kgN/yr kgP/yr	
New Woodland	35	ha kgN/ha/yr	See Proposed Land Use Tab
New Woodland Area nitrogen load New Woodland Area phosphorous load	0.02	kgP/ha/yr	
Nitrogen Load from New Woodland	175	kgN/yr	
Phosphorous Load from New Woodland		kgP/yr	
Combined nitrogen load from future land uses	6335.45	kgN/yr	

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from too desprese hereing insurements and as a direct to restrict of and

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Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Urban Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).					

Stage 1 to Stage 3 Nutrient Loading Calcs Summary			
	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load			WWTW DWF Excluded
Stage 2 - existing agriculture landuse load	11573.2	196.3	
Stage 3 - proposed development landuse load	6335.5	320.1	

Stage 4 - Net Change in Nitrogen and Phosphorous Budget		
	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	0.0	0.0
Step 2 (Stage 3 - Stage 2)	-5237.7	123.8
Step 3 (Step 1 + Step 2)	-5237.7	123.8
Step 4 (= Step 3, i.e. N/P budget without buffer)	-5237.7	123.8
Step 5 (Step 4*20%)	-1047.5	24.8
Step 6 (Step 4 + Step 5)	-6285.3	148.6
	-6285.3	148.6

itrogen/Phosphorous Budget with 20% buffer

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3. Otterpool FM@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	Town - Masterplan Framework Only		
Number of residential dwellings (Class C3)	0		
Number of residential dwellings (Class C2)	0		
Hotel Bedrooms (Class C1)	0		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	-	Units/ Data source	Further information
Step 1 calculate additional population	Figures	Units/ Data source	Further information
Occupancy rate			
Step 2 confirm water use (litres per person)			
Step 3 confirm Waste water Treatment Works (WwTW)			
and permitted TN concentration			
Permitted Total Phosphate concentration Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool			
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool			
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment			
Additional population (Residential Class C3)			
Additional population (Residential Class C2)			
Additional population (Hotel Class C1)			
Wastewater volume generated by development Receiving WwTW environmental permit for TN			
Receiving WwTW environmental permit for TN Receiving WwTW environmental permit for TP			
90% of the proposed consent TN limit			
90% of the proposed consent TP limit			
TN discharged after WwTW treatment			
TP discharged after WwTW treatment Annual wastewater total nitrogen load			
Annual wastewater total hitrogen load			
Stage 2	Figures	Units/ Data source	Further information
	A mixture of arable land (i.e.	Ecology Survey report reference/remote imagery	
	Cereals/Lowland Grazing Livestock), Hay Cut, Mixed and		
	Other Grassland (see the		
	breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this		
	largely based on the habitat survey info presented in the previous OP		
	Outline Planning Application in		
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total and a factories to all all and all and all and all		ter terre	On Table On OD A lower Date Tab
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
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Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	613.4 See Table 24/28	hectures kgNihalyr	See Table 2A/2B & Input Data Tab
			See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgNihalyr	See Table 24/28 & Input Data Tab
Nitrate loss from current site land use Phosphate loss from current site land use	See Table 2A/2B See Table 2A/2B	kgNihalyr knPihalyr	
Nitrate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B See Table 2A/2B	kgNihalyr knPihalyr	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use	See Table 24/28 See Table 24/28 11573 19 195.25	kgNihaiyr kaPhaiyr kgPiyr kgPiyr	See Table 2A/2B See Table 2A/2B
Nitrate loss from current site land use Phosphate loss from current site land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3	See Table 24/28 See Table 24/28 11973.19 196.26 Figures	kgN'ha'yr knP'ha'yr kgN'yr KgP'yr units/ Data source	See Table 24/26 See Table 24/26 Further information
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 24/28 See Table 24/28 195.25 Figures 350.5	kgN/halyr keP/halyr kgP/yr kgP/yr hctareufsite layout	See Table 2A/2B See Table 2A/2B
Nitrate loss from current site land use Phosphate loss from current late land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area Titopan Ioad	See Table 24/28 See Table 24/28 195.25 Figures 14.3 14.3	kgN/halyr knP/halyr kgNyr kgNyr kgPiyr hectares/site layout koNhalyr	See Table 24/26 See Table 24/26 Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total initiate loss from current land use Stage 3 New ruthan area Urban area hirogon load Urban area hirogon load	See Table 24/28 See Table 24/28 11573.19 1956.25 Figures 14.3 0 83	kgN/ha/yr knP/ha/yr kgNyr kgPyr hoccaraelute layout kgNha/yr kgPha/yr	See Table 24/26 See Table 24/26 Further information
Nitrate loss from current site land use Phosphate loss from current late land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area Titopan Ioad	See Table 24/28 See Table 24/28 195.25 Figures 14.3 14.3	kgN/ha/yr knP/ha/yr kgNyr kgPyr hoccaraelute layout kgNha/yr kgPha/yr	See Table 24/26 See Table 24/26 Further information
Nitrate loss from current sile land use Phosphate loss from current land use Total initiate loss from current land use Stage 3 New ruthan area Urban area hirogon load Urban area hirogon load	See Table 24/28 See Table 24/28 11573.19 1956.25 Figures 14.3 0 83	kgN/ha/yr knP/ha/yr kgNyr kgPyr hoccaraelute layout kgNha/yr kgPha/yr	See Table 24/26 See Table 24/26 Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area initigen load Urban area phosphate load Nitrogen load from future urban area	See Table 2A/2B See Table 2A/2B 195.25 Figures 50.5 14.3 0.83 5012.15	kgNiha'yr knPiha'yr kgNyr kgPyr hccareus'site layout kgNiha'yr kgPiha'yr kgNihyr	See Table 24/26 See Table 24/26 Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area	See Table 2A/2B See Table 2A/2B 11952.5 Figures 350.5 14.3 0.83 5012.15 220.92	kgNihalyr knPihalyr kgNiyr kgPyr hoctareufsite layout kgNhalyr kgPihalyr kgPiyr	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Whan area phosphate load Uthan area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space	See Table 24/28 See Table 24/28 11573 18 196 26 Figures 505.5 303 5012.15 200 92 183.6	kgN/halyr kgN/yr kgNyr kgNyr kgNhalyr kgNhalyr kgNhalyr kgNyr kgNyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initiale loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Witrogen load from future urban area Phosphorous load from future urban area New SANGloopen oppoor SANGloopen oppoor	See Table 2A/2B See Table 2A/2B 11573.19 195.25 14.3 0.83 5012.15 290.92 183.6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	kgNihalyr knPihalyr kgNiyr kgPiyr hectares/site layout kgPihalyr kgNhalyr kgNiyr kgNyr ha kgNiyr	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 We withan area Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space hoseborous load	See Table 24/28 See Table 24/28 11573.19 186.26 Figures 350.5 0.033 5012.15 290.92 185.6 5 0.14	kgN/ha'yr knP/ha'yr kgP/yr kgP/yr kgN/ha'yr kgP/hyr kgP/yr kgP/yr RgP/yr ba kgNha'yr kgP/yr	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area New SANGlogen space SANGlogen space phosphorous load SANGlogen space	See Table 2A/2B See Table 2A/2B 11573.19 195.25 143.3 0.83 5012.15 290.92 183.6 5 0.14 9.16	kgNihalyr knPihalyr kgNiyr kgPiyr hectaresi/site layout kgPihalyr kgNihalyr kgNiyr kgNiyr ha kgPiyr ha	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Wew urban area Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space SANG/open space phosphorous load SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space Phosphorous Load from SANG/open space	See Table 24/28 See Table 24/28 Figures 350.5 14.3 0.83 5012.15 290.92 183.6 5 9 9 9 19 8 8	kgNhaiyr ksPhaiyr kgPyr tgPyr hocares/site layout kgPhayr kgPhayr kgNhayr kgNyr ha kgNhayr kgNyr ha	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Nitrate loss from current sile land use Phosphate loss from current land use Total initiate loss from current land use Stage 3 New urban area Urban area hirogen load Urban area horogen load Urban area horogen load Urban area Phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGiopen space Phosphorous load from SANGiopen space New Community Farm/Alichments area	See Table 2A/2B See Table 2A/2B 11573.19 1952.25 Figures 3835 5012.15 290.92 183.6 5 5 915 915 915 92570 2570 2570	kgNIhalyr knPihalyr kgNyr kgPyr hocharaeliate layout kgPihalyr ggNigr kgPiyr kgPiyr kgPiyr kgPiyr kgPiyr ha ha ha ha ha ha ha ha ha kgPiyr kgPiyr ha ha kgPiyr kgPiyr ha ha kgPiyr kgPiyr ha ha kgPiyr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 We withan area Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space SANG/open space phosphorous load SANG/open space New Community Farm/Aldoments area New Community Farm/Aldoments antogen load New Community Farm/Aldoments hotogen load New Community Farm/Aldoments hotogen load	See Table 24/28 See Table 24/28 Figures 59505 14.3 0.83 5012.15 290.92 183.6 5 0.14 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0	kgN/ha/yr kgP/ha/yr kgP/yr hccareu/site iayout kgP/ha/yr kgP/ha/yr kgP/yr ha kgP/ha/yr kgP/hyr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr kgP/yr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current sile land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area horpophate load Urban area horpophate load Nitrogen load Group and Gro	See Table 24/28 See Table 24/28 11973.19 1995.26 Figures 350.5 5012.15 290.92 183.6 5 5 290.92 183.6 5 5 290.92 25.7 2,25 2,25 2,25 2,25 2,25 2,25 2,25 2,2	kgNiha'yr knPiha'yr kgNyr kgPyr hoctareelsile layout kgPhayr kgPhayr kgPyr ha kgPyr ha kgPyr ha kgPhayr kgPhayr kgPhayr kgPhayr kgPhayr kgPhayr kgNayr kgPhayr kgNayr kgNayr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 We withan area Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space SANG/open space SA	See Table 24/28 See Table 24/28 Figures 59505 14.3 0.83 5012.15 290.92 183.6 5 0.14 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0	kgNhalyr kgPipalyr kgPiyr hccareufalte layout kgPihalyr kgPihayr kgPiyr ha kgPihayr kgPiyr ha kgPihayr kgPiyr ha kgPinayr kgPiyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr kgPyr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details.
Nitrate loss from current sile land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New unban area New Sanghate losd Nitrogen load Curban area New SANGiopen space SANGiopen space phosphorous load New Community Farm/Alictments New Community Farm/Alictments Phosphorous Load from New Community Farm/Alictments Phosy Modiand	See Table 24/28 See Table 24/28 11573,18 Figures 505,0 303,0 33 5012,15 280,92 183,6 5,0 14,3 0,83 5012,15 280,92 183,6 5,0 14,4 918 2,57 0,0 8,8 2,25,2 0,28 2,25,2 2,20,32 2,20,32 2,20,35 2,25,25,2 2,25,25,2 2,25,25,25,25,25,25,25,25,25,25,25,25,25	kgNhalyr kgPyr kgPyr bectarewidite layout kgPhalyr kgPhyr kgPyr ha kgPhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPyr ha kgPhyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr kgPyr kgPyr kgPyr ha kgPhyr kgPy	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Were urban area Whom area nitrogo lood What area nitrogo lood What area nitrogo lood What area Phosphorous load from future urban area Phosphorous load from future urban area New SANGlopen space nitrogen load Nitrogen Load from SANGlopen space Phosphorous Load from SANGlopen space New Community Farm/Aldiments New Community Farm/Aldiments Nitrogen Load from Community Farm/Aldiments New Community Farm/Aldiments Nitrogen Load from Community Farm/Aldiments Nitrogen Load from Area phosphorous load Nitrogen Load from New Community Farm/Aldiments New Woodland Area phosphorous load	See Table 24/28 See Table 24/28 11573,18 Figures 505,0 303,0 33 5012,15 280,92 183,6 5,0 14,3 0,83 5012,15 280,92 183,6 5,0 14,4 918 2,57 0,0 8,8 2,25,2 0,28 2,25,2 2,20,32 2,20,32 2,20,35 2,25,25,2 2,25,25,2 2,25,25,25,25,25,25,25,25,25,25,25,25,25	kgNhalyr kgPyr kgPyr bectarewidite layout kgPhalyr kgPhyr kgPyr ha kgPhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPyr ha kgPhyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr kgPyr kgPyr kgPyr ha kgPhyr kgPy	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details.
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Total Phosphate loss from current land use Chan area hizpon load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area New SANG(open space SANG(open space phosphorous load Nitrogen Load from SANG(open space SANG(open space SANG(open space SANG(open space SANG(open space New Community Farm/Alditments New Community Farm/Alditments New Community Farm/Alditments New Community Farm/Alditments New Woodland Area phosphorous load Nitrogen Load New Woodland Area phosphorous load New Woodland New New Woodland New Woodland New New Yoodland New Woodland New New Yoodland	See Table 24/28 See Table 24/28 11573,18 Figures 505,5 30,03 5012,15 280,92 183,6 5,0,14 183,6 5,0,14 918 2,5,70 8,8 3,0,28 5,0,14 918 2,5,70 8,8 3,0,28 3,0,28 2,00,30 2,25 3,0,28 3,0,29 3,0,	kgNhalyr kgNyr kgNyr gefyr hectarewidio layout kgNhalyr kgNalyr kgNalyr kgNalyr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Were urban area Whom area nitrogo lood What area nitrogo lood What area nitrogo lood What area Phosphorous load from future urban area Phosphorous load from future urban area New SANGlopen space nitrogen load Nitrogen Load from SANGlopen space Phosphorous Load from SANGlopen space New Community Farm/Aldiments New Community Farm/Aldiments Nitrogen Load from Community Farm/Aldiments New Community Farm/Aldiments Nitrogen Load from Community Farm/Aldiments Nitrogen Load from Area phosphorous load Nitrogen Load from New Community Farm/Aldiments New Woodland Area phosphorous load	See Table 24/28 See Table 24/28 11573,18 Figures 505,5 30,03 5012,15 280,92 183,6 5,0 14,3 3,0 33,5 5012,15 280,92 183,6 5,0 14,4 918 2,5 7,0 2,2 5,0 2,0 5,0 5,0 5,0 5,0 5,0 5,0 5,0 5,0 5,0 5	kgNhalyr kgPyr kgPyr bectarewidite layout kgPhalyr kgPhyr kgPyr ha kgPhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPhyr ha kgNhalyr kgPyr ha kgPhyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr ha kgPhyr kgPyr kgPyr kgPyr kgPyr ha kgPhyr kgPy	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load torn future urban area Phosphorous load from future urban area New SANGiopen space SANGiopen space phospharous load SANGiopen space phospharous load Nitrogen load from SANGiopen space Phosphorous load from SANGiopen space New Community Farm/Alidoments area New Community Farm/Alidoments New Community Farm/Alidoments New Community Farm/Alidoments New Community Farm/Alidoments New Woodiand Area phosphorous load Nitrogen Load from Nex Community Farm/Alidoments New Woodiand Area phosphorous load Nitrogen Load from New Community Farm/Alidoments New Woodiand Area phosphorous load Nitrogen Load from New Community Farm/Alidoments New Woodiand Area phosphorous load Nitrogen Load from New Woodiand Phosphorous Load from New Woodiand New Woodiand Area phosphorous load New Woodiand Phosphorous Load from New Wood	See Table 24/28 See Table 24/28 Figures 505/5 111573.19 195.26 507/215 290.92 183.6 507/215 290.92 183.6 507/215 290.92 183.6 507/215 290.92 183.6 507/215 290.92 183.6 507/215 290.92 183.6 507/215 290.92 183.6 507/215 195.7 1	kgNhaiyr kaPhaiyr kgPiy kgPyr taPyr hccaredrilate layout kgPhayr kgNyr kgNyr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr kgNyr kgNyr ha kgNayr kgNyr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use We urban area Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space New Community Farm/Alditments area New Community Farm/Alditments intogen load New Community Farm/Alditments mean New Community Farm/Alditments New Community Farm/Alditments New Woodland Area phosphorous load New Woodland Area phosphorous load New Woodland Mens hittingen load	See Table 24/28 See Table 24/28 11573,18 Figures 505,5 30,03 5012,15 280,92 183,6 5,0 14,3 3,0 33,5 5012,15 280,92 183,6 5,0 14,4 918 2,5 7,0 2,2 5,0 2,0 5,0 5,0 5,0 5,0 5,0 5,0 5,0 5,0 5,0 5	kgNhaiyr kaPhaiyr kgPiy kgPyr taPyr hccaredrilate layout kgPhayr kgNyr kgNyr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr ha kgNayr kgNyr kgNyr kgNyr ha kgNayr kgNyr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details.

is nutrient budget is provided in good faith, populated using the st available science and expert option and adhering to the ecautionary principle. Arcadis accept no responsibility from loss damage however incurred as a direct or indirect result of acting the science of t

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Fram

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterpla	an Framework)				
		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

			Average Nutrient Loss Rate		ent loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/halyr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)	
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00	
CSD9B (Urban)	0	14.3	0.83	0.00	0.00	
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00	
CSD9A (Urban)	0	14.3	0.83	0.00	0.00	
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00	
	0.0			0.00	0.00	
* Note that Sellindge Sites are not applicapable for this calcula	ote that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).					

	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load			WWTW DWF Excluded
Stage 2 - existing agriculture landuse load	11573.2	196.3	
Stage 3 - proposed development landuse load	6335.5	320.1	

Stage 4 - Net Change in Nitrogen and Phosphorous Budge	t .		
	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	0.0	0.0	
Step 2 (Stage 3 - Stage 2)	-5237.7	123.8	
Step 3 (Step 1 + Step 2)	-5237.7	123.8	
Step 4 (= Step 3, i.e. N/P budget without buffer)	-5237.7	123.8	
Step 5 (Step 4*20%)	-1047.5	24.8	
Step 6 (Step 4 + Step 5)	-6285.3	148.6	
	-6285.3	148.6	Only Land Use Nutrient Budget Included

n/Phosphorous Budget with 20% buffer

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

			1	
	PCC (Sci	PCC (Scenario 1)		enario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Severn Trent Connect - onsite WwTW	-6285	149	-6285	149
Nutrient Mitigation - Wetland Area Requirement	Summary			
	PCC (Sc	enario 1)	PCC (Sce	enario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Severn Trent Connect - onsite WwTW	-6.8	12.4	-6.8	12.4
Assumed Wetland TN removal rate Assumed Wetland TP removal rate		g/m2/yr g/m2/yr		kg/ha/yr kg/ha/yr
	PCC Scenario 1 Residential (Class C3) = 110 Residential (Class C2) = 350 Hotel (Class C1) = 300 l/p/d		PCC Scenario 2 Residential (Class C3) = 110 Residential (Class C2) = 262 Hotel (Class C1) = 225 l/p/d	

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Ushen Area (ha)	New Onen Sneed (he)	Tatal Site Area (ha)	Important its (9/)	
	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A					
Sellindge CSD9B					
CSD9A & 9B TOTAL	0	0.00	0		0

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTI	ERPOOL FRAMEWORK MASTERPL	<u>LAN</u>
	На	На
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	183.6	
Total Urban Area in Framework Masterplan	350.5	
Total OP Framework Area Check	756.1	

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

Onsite WwTW

Scenario 3 - Land Use Discharges Only Loading

3C - Otterpool NN (V1.8) - Onsite WwTW - OFMA & Sellindge Land Use.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC	
	Masterplan Framework (incl	
Development name	CSD9A & CSD9B)	
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/
Number of residential dwellings (Class C3)	9054	
Number of residential dwellings (Class C2)	1296	
Hotel Bedrooms (Class C1)	117	
Local Planning Authority	Folkstone and Hythe DC	

	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	Not Used in this Calcs as onsite WwTW is used instead
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
			Environment Agency - this is indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Known	0.2	mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site			See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
	784.1	Tiectares	See Floposed Land Ose Tab	Olleipool Park FiviF plus CSD9A & CSD9B
New Urban Area	369.0	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of designated Suitable Alternative Natural Space (SANG)/open space	193.10	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of Community Farm/Allotments	0.8	hastaraa	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of Community Farm/Allotments	9.8	hectares	Based on the habitat survey info	Ollerpool Park FIMP plus CSD9A & CSD9B
			presented in the previous OP	
			Outline Planning Application in	
			2019, consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved			
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below See Table 1 below	kgN/ha/yr		
nitrate loss from current site land use	See Table 1 Delow	ngi vi liai yi		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	
Lowland Grazing Livestock	119.1	12.2	0.24	
Racetrack	13.5	13.3		Average of urban & lowland grazing livestock loss rates used.
Hay Cut	18.9	5	0.14	
Other Grassland/Greenfield	101.1	5	0.14	1
Mixed area - Urban	11.5	14.3	0.83	
Mixed area - Greenfield	4.5	5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	
	613.4			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)
CSD9B (Cereals)	17.16	27.3	0.36
CSD9B (Urban)	0.7	14.3	0.83
CSD9B (Other Grassland/greenfield)	1.05	5	0.14
CSD9A (Urban)	0.08	14.3	0.83
CSD9A (Other Grassland/greenfield)	8.98	5	0.14
	27.07		

2. Otterpool FM+CSD9A&B@110(S1)

New development ind ogen budget			
Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development	Framework (incl CSD9A & CSD9B)		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	9054 1296		
Hotel Bedrooms (Class C1)	1250		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	-	Units/ Data source	Further information
Stage 1 Step 1 calculate additional population	Figures	Units/ Data source	Further information
Occupancy rate			
Step 2 confirm water use (litres per person)			
Step 3 confirm Waste water Treatment Works (WwTW)			
and permitted TN concentration			
Permitted Total Phosphate concentration			
Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool			
Proposed permitted Total Phosphate concentration to accommodate Otterpool			
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment			
Additional population (Residential Class C3)			
Additional population (Residential Class C2) Additional population (Hotel Class C1)			
Wastewater volume generated by development			
Receiving WwTW environmental permit for TN			
Receiving WwTW environmental permit for TP			
90% of the proposed consent TN limit 90% of the proposed consent TP limit			
90% of the proposed consent TP limit TN discharged after WwTW treatment			
TP discharged after WwTW treatment			
Annual wastewater total nitrogen load			
Annual wastewater total phosphorous load			
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland		
	Grazing Livestock), Hay Cut, Mixed and Other Grassland (see the breakdown in Table 2		
	below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey info		
	presented in the previous OP Outline Planning		
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgN/ha/yr	
- · · · · · · · · · · ·			
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B 12102.96	knP/ha/yr	See Table 2A/2B
Total Phosphate loss from current land use	204.49	kgP/vr	See Table 2A/2B
Stage 3	Figures	units/ Data source	Further information
New urban area Urban area nitrogen load	369.0	hectares/site layout kgN/ha/yr	See Proposed Land Use Tab
Urban area phosphate load	0.83	kgP/ba/vr	
Nitrogen load from future urban area	5276.27	kgN/yr	
Phosphorous load from future urban area	306.25	kgP/yr	
New SANG/open space	193.1	h	Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
SANG/open space SANG/open space nitrogen load		na kgN/ha/yr	Data Tab and Proposed Land Use Tab for details.
SANG/open space phosphorous load	0.14	kgP/ha/vr	
Nitrogen Load from SANG/open space	965.5	kgN/yr	
Phosphorous Load from SANG/open space New Community Farm/Allotments area		kgP/yr	See Input Data Tab and Proposed Land Use Tab for details.
New Community Farm/Allotments area	9.8 23.5	na kgN/ha/yr	ore mput pata rap and Proposed Land Use rap for details.
New Community Farm/Allotments phosphorous load	0.28	kgP/ha/yr	
Nitrogen Load from Community Farm/Allotments	230.30	kgN/yr	
Phosphorous Load from New Community Farm/Allotments	2.74	kgP/yr	See Proposed Land Use Tab
New Woodland Area nitrogen load		na kgN/ha/yr	Gee Freposed Land USB Tab
New Woodland Area phosphorous load	0.02	kaP/ha/vr	
Nitrogen Load from New Woodland	175	kgN/yr	
Phosphorous Load from New Woodland	0.70	kgP/yr	
Combined nitrogen load from future land uses	6647.07	kgN/yr	
Combined phosphorous load from future land uses	336.72	kgP/yr	

Disclaimer:

This nutrient budget is provided in good faith, populated using best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from In degree and a different as different as indicated and the science of the science of

ew development nitrogen budget

upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework

Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Urban Mixed area - Greenfield Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutri	unt loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD98 (Cereals) CSD98 (Urban)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calcs Summary					
	TN (kgN/yr)	TP (kgP/yr)			
Stage 1 - WwTW load					
Stage 2 - existing agriculture landuse load	12103.0	204.5			
Stage 3 - proposed development landuse load	6647.1	336.7			

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	0.0	0.0	
tep 2 (Stage 3 - Stage 2)	-5455.9	132.2	
Step 3 (Step 1 + Step 2)	-5455.9	132.2	
itep 4 (= Step 3, i.e. N/P budget without buffer)	-5455.9	132.2	
itep 5 (Step 4*20%)	-1091.2	26.4	
itep 6 (Step 4 + Step 5)	-6547.1	158.7	
	-6547.1	158.7	
	-0347.1	130.7	
		100.1	
Vitrogen/Phosphorous Budget with 20% buffer			

3. Otterpool FM+CSD9A&B@110(S2)

Client	Folkstone and Hythe DC		
Development	Framework (incl CSD9A & CSD9B)		
Number of residential dwellings (Class C3)	9054		
Number of residential dwellings (Class C2)	1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population	rigurea	Childs Data source	r di dier mormation
Occupancy rate			
Step 2 confirm water use (litres per person)			
,			
Step 3 confirm Waste water Treatment Works (WwTW)			
and permitted TN concentration			
Permitted Total Phosphate concentration			
Proposed permitted Total Nitrogen concentration to accommodate			
Otterpool			
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool			
Step 4 calculate Total Nitrogen (TN) in kg per annum that would			
exit the WwTW after treatment			
Additional population (Residential Class C3)			
Additional population (Residential Class C2) Additional population (Hotel Class C1)			
Wastewater volume generated by development			
Receiving WwTW environmental permit for TN			
Receiving WwTW environmental permit for TP			
90% of the proposed consent TN limit			
90% of the proposed consent TP limit			
TN discharged after WwTW treatment			
TP discharged after WwTW treatment			
Annual wastewater total nitrogen load			
Annual wastewater total phosphorous load			
Stage 2		Units/ Data source	Further information
oldge z	Figures	Ecology Survey report reference/remote imagery	Further Information
	Cereals/Lowland Grazing	Ecology Survey report reference/remote imagery	
	Livestock), Hay Cut, Mixed and		
	Other Grassland (see the		
	breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this		
	largely based on the habitat survey		
	info presented in the previous OP		
Current land use	Outline Planning Application in 2019		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
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Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
			See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land Nilfrate loss from current site land use	641.4 See Table 2A/2B	kectares kgN/ha/yr	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgN/halyr	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B See Table 2A/2B	kgN/halyr knP/halyr	
Nitrate loss from current site land use Phosphate loss from current site land use	See Table 2A/2B See Table 2A/2B 12182 96	kgN/halyr knP/halyr	See Table 24/28
Nitrate loss from current site land use Phosphate loss from current site land use	See Table 2A/2B See Table 2A/2B	kgN/halyr knP/halyr	
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use	See Table 2A/2B See Table 2A/2B 12102.96 204.49	kgNihaiyr knPihaiyr kgPiyr	See Table 2A/2B See Table 2A/2B
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Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 860.0	kgNihalyr knPihalyr kgPlyr kgPlyr units/ Data source	See Table 2A/2B See Table 2A/2B
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Stage 3 Stage 3	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 300 14.3 0 83	kgN/halyr knP/halyr kgNyr kgNyr kgPry units/ Data source hockerea/ute layout kgNhalyr kgPhalyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Stage 3 Urban area hirogen load Urban area hirogen load	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 300 14.3 0 83	kgN/halyr knP/halyr kgNyr kgNyr kgPry units/ Data source hockerea/ute layout kgNhalyr kgPhalyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Stage 3 Urban area hirogen load Urban area hirogen load	See Table 2A/2B See Table 2A/2B 12102.96 204.9 Figures 369.0 14.3	kgN/halyr knP/halyr kgNyr kgNyr kgPry units/ Data source hockerea/ute layout kgNhalyr kgPhalyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Stage 3 Wow urban area Urban area Nitrogen load Urban area phosphate load	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 300 14.3 0 83	kgN/halyr knP/halyr kgNyr kgNyr kgPry units/ Data source hockerea/ute layout kgNhalyr kgPhalyr	See Table 24/28 See Table 24/28 Further information
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Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area initopan load Urban area phosphate load Nitrogen load from future urban area	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 300 14.3 0 83	kgN/halyr knP/halyr koN/vr kgP/yr hectares/site layout kgP/nalyr kgP/nalyr kgNhalyr	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab
Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 5276.27 306.25	kgN/halyr knP/halyr kgP/yr units/ Data source hectares/site layout kgP/nalyr kgP/nalyr kgP/yr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed militgation areas (i.e. Wetland & Woodland areas). See Input Data Tab
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New development nitrogen budget

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masters	olan Framework)				
		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/halyr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban Mixed area - Greenfield	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

ole 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

0 204.5 1 338.7 (vr) TP (kgP(vr))
336.7
vr) TP (kgPlyr)
yr) TP (kgP/yr)
Vr) TP (KgP/yr)
0.0
9 132.2
9 132.2
9 132.2
2 26.4
1 158.7
1 158.7
0 14 1

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Severn Trent Connect - onsite WwTW	-6547	159	-6547	159

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Sce	enario 1)	PCC (Sce	enario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Severn Trent Connect - onsite WwTW	-7.0	13.2	-7.0	13.2

Assumed Wetland TN removal rate Assumed Wetland TP removal rate 93 g/m2/yr 1.2 g/m2/yr 930 kg/ha/yr 12 kg/ha/yr

PCC Scenario 1

Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2

Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d





7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A	7.56	1.50	9.06	83%	188
Sellindge CSD9B	10.91	8.00	18.91	58%	162
CSD9A & 9B TOTAL	18.47	9.50	27.97		350

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTERPOOL FRAMEWORK MASTERPLAN

	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	183.6	
Total Urban Area in Framework Masterplan	350.5	
Total OP Framework Area Check	756.1	

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

APPENDIX E

Nutrient Neutrality Assessment – For Sellindge WwTW

Excel calculations printouts associated with Nutrient Neutrality Assessment (i.e., for the combined land use and WwTW Discharges Loading) are given for the Sellindge WwTW proposal for:

- Otterpool Framework Masterplan Area (OFMA)
- OFMA and Sellindge Phase 2 Sites Combined

Sensitivity testing are also given to account for the 61ha of additional open space areas in urban development parcels (i.e., those additional Public Open Space currently not shown in Tier 1 Parameter Plans to facilitate more flexibility in masterplanning in Tier 2 and Tier 3 stages)

Common datasheets (e.g. existing land use type measurement information – worksheets 5 & 6, wetland hydraulic loading calculations – worksheet 8) are generally not repeated unless some information is different.

Sellindge WwTW

Combined Land Use and WwTW Discharges Loading

Otterpool Nitrogen Budget - V1.8 - Sellindge WwTW - Otterpool FMP & Sellindge.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC	
	Masterplan Framework (incl	
Development name	CSD9A & CSD9B)	
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/
Number of residential dwellings (Class C3)	9054	
Number of residential dwellings (Class C2)	1296	
Hotel Bedrooms (Class C1)	117	
Local Planning Authority	Folkstone and Hythe DC	

	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A			
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A		Environment Agency	
			Environment Agency - this is indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Known	0.3		accommodate Otterpool	
Total area of site			See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
	704.1	liectares	See Proposed Land Ose Tab	Olleipool Park Tim pius CobeA & Cobeb
New Urban Area	369.0	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of designated Suitable Alternative Natural Space (SANG)/open space	193.10	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
				Otherward Dark FMD alter OCD04 & OCD0D
Area of Community Farm/Allotments	9.8		See Proposed Land Use Tab Based on the habitat survey info	Otterpool Park FMP plus CSD9A & CSD9B
			presented in the previous OP Outline Planning Application in	
			2019, consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved			
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below			
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)		
Cereals	324.9	27.3	0.36		
Lowland Grazing Livestock	119.1	12.2	0.24		
Racetrack	13.5	13.3		Average of urban & lowland grazing livestock loss rates used.	
Hay Cut	18.9	5	0.14		
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield	101.1	5	0.14		
Mixed area - Urban	11.5	14.3	0.83		
	4.5	5	0.14		
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83		
	612.4				

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
CSD9B (Cereals)	17.16	27.3	0.36	
CSD9B (Urban)	0.7	14.3	0.83	
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	
CSD9A (Urban)	0.08	14.3	0.83	
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	
	27.07			

2. Otterpool FM+CSD9A&B@110(S1)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development Number of residential dwellings (Class C3)	Framework (incl CSD9A & CSD9B) 9054		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	9054 1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	-		
Stage 1 Step 1 calculate additional population	Figures	Units/ Data source	Further information
Occupancy rate	24	Natural England recommendation	
Step 2 confirm water use (litres per person)	110	l/p/d Natural England recommendation - for resinential Class C1	
	350	l/p/d British Water recommendation - for residential Class C2	No allowance included for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	300 Sellindae WwTW	l/p/d British Water recommendation - for Hotel Class C1	No allowance include for Otterpool water efficiency measures
and permitted TN concentration	Sellindge WwTW	Southern Water mg/l Southern Water	N/A, Subject to review in 2022.
Permitted Total Phosphate concentration	1	mg/l Southern Water	Current Sellndae Permit TP.
·		<u> </u>	
			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to achieve TN value of 25 mg/l as per SW advice received. However, a
Proposed permitted Total Nitrogen concentration to accommodate	25	mg/I Southern Water/NE	expect to achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required.
Proposed permitted Total Phosphate concentration to	20	nigri Soddrenn Water/NE	use of MBR could potentially further lower this TN liquie if required.
Proposed permitted Total Phosphate concentration to accommodate Otterpool	0.3	ma/I Environment Agency	Proposed TP at Sellindge permit.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.3	myn Enwonniais Agailey	rioposos nº di obilitugo permit.
exit the WwTW after treatment			
Additional population (Residential Class C3)	21729.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)	3110.4	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room
Additional population (Hotel Class C1) Wastewater volume generated by development	234 3549096	litres/day	Assumed 2.0 Occupancy Raterper rount
			N/A, Subject to review in 2022. The currently proposed design at Sellindge
			expect to achieve TN value of 25 mg/l as per SW advice received. However, a
Receiving WwTW environmental permit for TN	25	mg/I TN	use of MBR could potentially further lower this TN figure if required.
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit	0.3	mg/ITP mg/ITN	Used proposed EA TP permit level for Sellindge WwTW upgrade. Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit	22.5	mg/iTP	r pprovi vo ni concentri as a procassoridi y Udsis.
TN discharged after WwTW treatment	79854660	mg/TN/day	
TP discharged after WwTW treatment	958255.92	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	29146.95	kg/TN/yr kg/TP/yr	
Annual wastewater total prosphorous load	343.76	Ng/ IP/yi	
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland		
	Grazing Livestock), Hay Cut, Mixed and Other Grassland (see the breakdown in Table 2		
	Grassland (see the breakdown in Table 2 below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey info		
	presented in the previous OP Outline Planning		
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	641.4	heclares	See Table 24/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	heclares	See Table 24/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 24/28 & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
			See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land	641.4 See Table 24/28	hectares kgNihalyr	See Table 24/2B & Input Data Tab
			See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B See Table 2A/2B	kgNihalyr KDPihalyr	See Table 24/28 & Input Data Tab
Nitrate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current land use	See Table 24/28 See Table 24/28 12102.95	kgNihalyr knP/na/yr knNrr	See Table 24/28
Nitrate loss from current site land use Phosphate loss from current site land use	See Table 2A/2B See Table 2A/2B	kgNihalyr knP/na/yr knNrr	
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use	See Table 24/28 See Table 24/28 12102.95 204.49	kgNihaiyr knPjihaiyr kgPlyr kgPlyr	See Table 2A/2B See Table 2A/2B
Nitrate loss from current site land use Phosphate loss from current site land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures	kgNihalyr kgPiyr kgPiyr units/ Data source	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current late land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area Initogen load	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 360.0 14.3	kgNihalyr kgNiyr kgNiyr kgPlyr hectares/site layout koNhalyr	See Table 2A/2B See Table 2A/2B
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 See Table 24/28 12102.96 204.49 Figures 0.43 0.43	kgNihalyr kgNihalyr kgNiyr gyfyr Lectaresidie layout kgNhalyr KgNhalyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current late land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area Initogen load	See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 360.0 14.3	kgNihalyr kgNihalyr kgNiyr gyfyr Lectaresidie layout kgNhalyr KgNhalyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 See Table 24/28 12102.96 204.49 Figures 0.43 0.43	kgNihalyr kgNihalyr kgNiyr gyfyr Lectaresidie layout kgNhalyr KgNhalyr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area	See Table 24/28 See Table 24/28 12102-96 204.49 Figures 366.0 14.3 0.83 5276.27	kgNiha'yr kgNyr kgNyr gPyr nectaresiste layout kgPina'yr kgPina'yr kgNiayr	See Table 24/28 See Table 24/28 Further information
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 See Table 24/28 12102.96 204.49 Figures 0.43 0.43	kgNiha'yr kgNyr kgNyr gPyr nectaresiste layout kgPina'yr kgPina'yr kgNiayr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab
Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area	See Table 24/25 See Table 24/25 12102-96 204.49 Figures 366.0 365.0 52/6.27 306.25	kgNihalyr kgNyr kgNyr wnits/ Data source hectares/site layout kgP/nalyr kgP/nalyr kgP/yr	See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Stage 3 New urban area Urban area Urban area Not Johan Galanti area Nitrogen load Nitrogen load from future urban area Phosphorous load from future urban area New SANG(open space	See Table 24/28 See Table 24/28 204.49 Figures 0.43 5276.27 306.25 193.1	kgNhalyr kgPhyr kgPyr hgPyr tgNhayr kgNhayr kgNhayr kgPhyr kgPyr ha	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab
Nitrate loss from current sile land use Phosphate loss from current sile land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space phosphorous load	See Table 24/28 See Table 24/28 12102.96 204.49 Figures 0.43 0.43 5276.27 3006.25 193.1 521.0 9.044	kgNihalyr IagNyr IggNyr Inclanesidia layout KgNhayr KgNiyr KgNyr KgPyr ha	See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space nitrogen load SANGlopen space	See Table 24/28 See Table 24/28 204.49 Figures 366.0 14.3 0.83 5276.27 306.25 151.1 5 0.54 626.5	kgNihalyr kgNiyr kgPiyr units/ Data source hectaresiate layout kgVhalyr kgViyr kgPiyr kgPiyr kgNalyr kgNalyr	See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input
Nitrate loss from current sile land use Phosphate loss from current land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/orps ngace nitrogen load SANG/open sgace SANG/open sgace Nator SANG/open space Nitrogen Load from SANG/open space	See Table 2A/2B See Table 2A/2B Figures 500.49 Figures 300.25 300	kgNihalyr kgNihalyr tgplyr units/ Data source hoctoresidie layout kgNhalyr kgNiyr kgNyr kgNyr kgNyr kgNyr kgNyr	See Table 24/28 See Table 24/28 Further information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 When area hitrogen load Urban area phosphate load Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGiopen space Phosphorous Load from SANGiopen space Phosphorous Load from SANGiopen space Phosphorous Load from SANGiopen space	See Table 24/28 See Table 24/28 204.49 Figures 368.0 14.3 0.83 52/76.27 306.25 192.3 9.0 4 9.0 4 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0	kgNiha'yr kgP/yr kgP/yr hectaresiato layout kgNha'yr kgNha'yr kgPlyr kgPlyr ha kgPhayr kgPlyr ha ha	See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input
Nitrate loss from current sile land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/copen space SANG/copen space SANG/copen space Notic dem SANG/copen space New community Farm/Aldoments area	See Table 2A/2B See Table 2A/2B 12/102.96 13204.49 Figures 308.0 308.3 5276.27 306.25 132.1 306.25 132.1 306.25 132.1 306.25 27.03 9.8 32.5 27.03 9.8 27.03 9.8 27.03 9.8 23.5	kgNihalyr knPihalyr kgNyr sgPyr units/ Data source becarestyllo layout tgNhalyr kgNayr kgNyr kgNyr kgPyr ha tgNayr tgNyr kgPyr ha tgNayr	See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Watland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 Wei urban area New SANGlopen space New SANGlopen space SANGlopen space SANGlopen space SANGlopen space SANGlopen space New SANGLOPEN Space SANGlopen SANGlopen space SANGlopen SANGLOPEN Space SANGLOPEN SANGLOPEN Space SANGLOPEN Space SANGLOPEN Space SANGLOPEN Space SANGLOPEN Space SANGLOPEN Space Space SANGLOPEN Space S	See Table 2A/2B See Table 2A/2B 12/102.96 Figures 204.49 183 5276.27 306.25 193.1 193.1 5276.27 306.25 27,03 9.8 27,03 9.8 27,03 9.8 22,5 0.28 23,5 0.28 23,5 0.28 23,5 0.28 23,00 23,00 23,00 23,00 23,00 23,00 23,00 23,00 23,00 23,00 23,00 24,000 24,0000 24,0000 24,0000 24,0000 24,0000 24,0000000000	kgNihalyr knPihalyr kgNyr hgNyr hochasiyi lagyir gPhayr gPhayr gRyr kgPlyr ha hagNalyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr	See Table 24/28 See Table 24/28 See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area hizogan load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGiopen space SANGiopen space nitrogen load SANGiopen space phosphorous load Nitrogen Load from SANGiopen space New Community Farm/Aldiments area New Community Farm/Aldiments area New Community Farm/Aldiments load Nitrogen Load from Community Farm/Aldiments New Community Farm/Aldiments load	See Table 24/2B See Table 24/2B 12102.96 204.49 Figures 306.25 306.25 306.25 193.1 5 0.14 306.25 0.14 306.25 0.14 306.25 276.27 276.27 306.25 276.27 276.27 276.27 276.27 20.30 2.24 20.30 2.24 2.20 2.20 2.20 2.20 2.20 2.20 2.2	kgNiha'yr knP/na'yr kgP/yr tgP/yr tgPhyr kgNha'yr kgNha'yr kgNyr tgPhyr ha kgNha'yr kgNyr tgPyr ha	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New ubban atka New ubban atka New ubban atka New sphorous load from future urban area Phosphorous load from future urban area New SANGloopen space SANGloopen space nitrogen load SANGloopen space nitrogen load SANGloopen space nitrogen load SANGloopen space Phosphorous Load from SANGloopen space Phosphorous Load from SANGloopen space Phosphorous Load from SANGloopen space New Community Farm/Alidemets nitrogen load New Community Farm/Alidemets nitrogen load	See Table 2A/2B See Table 2A/2B 12102.96 8000 1204.49 143 3000.25 3006.25 193.1 5 0.014 9065.5 0.27 205.2 20	kgNiha'yr kgNyr kgNyr beclaresiale laycut aghlayr ggNayr ggNyr kgPlyr ha kgNyr aghyr aghyr aghyr aghyr ba ballyr aghyr ba ballyr	See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Watland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Whom area nitrogen load Uthan area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous load from SANG/open space New Community Farm/Alkidments area New Woodland Area nitrogen load	See Table 24/28 See Table 24/28 204.49 Figures 366.0 143.3 0.83 5276.27 306.25 192.1 5 0.14 965.5 27,03 9.8 220.03 2,27 3 2,27 3 2,27 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	kgNihaiyr koPliadyr kgPlyr hctaresiste layout kgNhayr kgNihayr kgNiyr kgNyr	See Table 2A/2B See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
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Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Total Phosphate loss from current land use Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/oppen space SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous load from SANG/open space New Community Farm/Alditments area New Community Farm/Alditments Indeptionation New Community Farm/Alditments Phosphorous load Nitrogen Load from SANG/open space Phosphorous Load from SANG/open space New Community Farm/Alditments Phosphorous load New Community Farm/Alditments Phosphorous Load from New Community Farm/Alditments Phosphorous Load from New Community Farm/Alditments New Woodland Area phosphorous load New Woodland Area phosphorous load	See Table 24/25 See Table 24/25 204.49 Figures 560.0 143.0 .0.83 5276.27 306.25 193.1 5 1.44 065.5 2.27.03 0.14 0.14 065.5 2.27.03 0.14 0.14 0.14 0.14 0.14 0.14 0.15 0.25 0.25 0.25 0.25 0.25 0.27 0.27 0.27 0.27 0.27 0.27 0.27 0.27	kgNihalyr kgNiyr kgPlyr hotaresialo layout kgNhalyr kgNhalyr kgNhalyr kgNhalyr kgNihalyr ha kgNhalyr kgNyr ha kgNhalyr kgNyr ha kgNhalyr kgPlyr ha kgNhalyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr	See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed Land Use Tab for details. Excluded proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 24 Evicting Land Tunna and Nutriani Lang Bates (Ottamon) Masterian Ever

	Average Nutrient Loss Rate	Estimated Nutrient loss		
	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
324.9	27.3	0.36	8869.77	116.96
119.1	12.2	0.24	1453.02	28.58
13.5	13.25	0.535		7.22
18.9	5	0.14	94.50	2.65
101.1	5	0.14		14.15
11.5	14.3	0.83	164.45	9.55
4.5	5	0.14	22.50	0.63
19.9	14.3	0.83	284.57	16.52
613.4			11573.19	196.26
	135 189 101.1 115 45 159	Hectors Nitrade - Nitrogan (bg kiha)er] 324.9 27.3 118.1 27.3 118.1 12.2 13.0 12.2 13.0 13.2 13.9 3.3 15.1 3.6 15.3 3.6 15.3 3.6 15.3 3.6 15.5 3.6 15.3 3.6 15.3 3.6 15.3 3.6 15.3 3.6 15.3 3.6 15.3 3.6	Hectors Nirsta - Nirogan (ing Nhay) Piosphorous (ing Phay) 324.9 273 3.0.30 116.1 122 0.434 13.3 0.535 6.555 13.9 1.3.5 0.535 13.9 0.535 0.545 13.9 0.535 0.545 13.9 0.0.455 0.014 15.1 0.0.455 0.045 15.2 0.0.455 0.045 15.3 0.045 0.045 15.5 0.045 0.045 15.9 0.045 0.045 15.9 0.045 0.045	Hotase Nitrate - Nitroge fige (Naty) Phone (nge (Phar)) Nitrate - nitroge fige (Naty) 3243 273 0.08 Nitrate - nitroge fige (Naty) Nitrate - nitrade Naty Nitrat

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calos Summary						
	TN (kgN/yr)	TP (kgP/yr)				
Stage 1 - WwTW load	29147.0	349.8				
Stage 2 - existing agriculture landuse load	12103.0	204.5				
Stage 3 - proposed development landuse load	6647.1	336.7				

Stage 4 - Net Change in Nitrogen and Phosphorous Budget						
	TN (kgN/yr)	TP (kgP/yr)				
Step 1 (Stage 1)	29147.0	349.8				
Step 2 (Stage 3 - Stage 2)	-5455.9	132.2				
Step 3 (Step 1 + Step 2)	23691.1	482.0				
Step 4 (= Step 3, i.e. N/P budget without buffer)	23691.1	482.0				
Step 5 (Step 4*20%)	4738.2	96.4				
Step 6 (Step 4 + Step 5)	28429.3	578.4				
	28429.3	578.4				

litrogen/Phosphorous Budget with 20% buffer

3. Otterpool FM+CSD9A&B@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development Number of residential dwellings (Class C3)	Framework (incl CSD9A & CSD9B) 9054		
Number of residential dwellings (Class C3)	1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population		Natural England recommendation	
Occupancy rate Step 2 confirm water use (litres per person)		Natural England recommendation l/p/d Natural England recommendation - for resinential Class C1	
otop z oorinini watar abo (naco par parosin)	262.5	l/p/d British Water recommendation - for residential Class C2 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
	225	l/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW) and permitted TN concentration	Sellindge WwTW	Southern Water	N/A, Subject to review in 2022.
Permitted Total Phosphate concentration	1		Current Selindge Permit TP.
			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to
Proposed permitted Total Nitrogen concentration to accommodate Otterpool	25	ma/l Southern Water/NE	achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required.
Proposed permitted Total Phosphate concentration to			potentially failable foreigned in equiled.
accommodate Otterpool	0.3	mg/l Environment Agency	Proposed TP at Sellindge permit.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would		5 5 7	
exit the WwTW after treatment Additional population (Residential Class C3)	21729.6	Deveene	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C3)		Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)		Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3259386	litres/day	N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to
			achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could
Receiving WwTW environmental permit for TN	25	mg/I TN mg/I TP	potentially further lower this TN figure if required.
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit	0.3	mg/I TP mg/I TN	Used proposed EA TP permit level for Sellindge WwTW upgrade.
90% of the proposed consent TP limit	22.5	mg/I TP	Applied 90% correction as a precautionary basis.
TN discharged after WwTW treatment	73336185	mg/TN/day	
TP discharged after WwTW treatment Annual wastewater total nitrogen load	880034.22	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	26767.71 321.21	kg/TN/yr kg/TP/yr	
Stage 2	Figures A mixture of arable land (i.e.	Units/ Data source Ecology Survey report reference/remote imagery	Further information
	Cereals/Lowland Grazing		
	Livestock), Hay Cut, Mixed and Other Grassland (see the		
	breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this		
	largely based on the habitat survey info presented in the previous OP		
	Outline Planning Application in		
Current land use	2019		
Garron allu uso	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Contrast talled USD	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land		hectares	Sellindge CSD9A & CSD9B Sites included separately based on available data . See Table 2A/2B & Input Data Tab
		hectares	
Total area of existing 'agricultural' and other land	641.4		
		hociares kgN/ha/yr	
Total area of existing 'agricultural' and other land	641.4		
Total area of existing "agricultural" and other land Nitrate loss from current site land use Phosphate loss from current site land use	5ee Table 24/25 See Table 24/25	kgN/halyr knP/halyr	See Table 24/2B & Input Data Tab
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current site land use Total nitrate loss from current late land use	See Table 24/28 See Table 24/28 See Table 24/28 12/02.96	kgNlha'yr knPiha'yr	See Table 2A/2B & Input Data Tab
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current site land use Total ritrate loss from current land use Total Phosphate loss from current land use	641.4 See Table 24/28 See Table 24/28 12102.96 204.49	kgNihaiyr koPihaiyr KgPlyr kgPlyr	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	641.4 See Table 2A/2B See Table 2A/2B 12102.96 204.49 Figures 3060.0	kgNhalyr koP/halyr igR/yr kgP/yr hetaresisie layout teatresisie layout	See Table 24/2B & Input Data Tab See Table 24/2B See Table 24/2B See Table 24/2B
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use	641.4 See Table 2A/2B See Table 2A/2B 12102.95 204.69 Figures 14.3 360.0 14.3	kgNiha'yr knPiha'yr kgNyr kgPyr hectaresisile iayout kollawna'yr	See Table 2A/2B & Input Data Tab See Table 2A/2B See Table 2A/2B
Total area of existing 'egricultural' and other land Nitrate loss from current site land use Phosphate loss from current site land use Total initiate loss from current land use Total initiate loss from current land use Stage 3 New uthan area phosphate load Urban area phosphate load	041.4 See Table 2A/2B See Table 2A/2B 12/102.46 204.49 Figures 289.0 14.3 .0.83	kgNihalyr kgNihalyr kgNiyr gyfyr Inclaresislin layout kgNihalyr	See Table 24/2B & Input Data Tab See Table 24/2B See Table 24/2B See Table 24/2B
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current land use Total Phosphate loss from current land use	641.4 See Table 2A/2B See Table 2A/2B 12102.95 204.69 Figures 14.3 360.0 14.3	kgNihalyr kgNihalyr kgNiyr gyfyr Inclaresislin layout kgNihalyr	See Table 24/2B & Input Data Tab See Table 24/2B See Table 24/2B See Table 24/2B
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current land use Total initrate loss from current land use Total initrate loss from current land use Stage 3 New utban area phosphate load Utban area phosphate load	041.4 See Table 2A/2B See Table 2A/2B 12/102.46 204.49 Figures 289.0 14.3 .0.83	kgNihalyr kgNihalyr kgNiyr gyfyr Inclaresislin layout kgNihalyr	See Table 24/2B & Input Data Tab See Table 24/2B See Table 24/2B See Table 24/2B
Total area of existing 'egricultural' and other land Nitrate loss from current site land use Phosphate loss from current site land use Total initiate loss from current land use Total initiate loss from current land use Stage 3 New uthan area phosphate load Urban area phosphate load	041.4 See Table 2A/2B See Table 2A/2B 12/102.46 204.49 Figures 289.0 14.3 .0.83	kgN/halyr kgNyr kgNyr bectares/site layout kgP/na/yr kgP/na/yr kgNua/yr	See Table 24/28 & Input Data Tab See Table 24/28 See Table 24/28 See Table 24/28 Further Information See Proposed Land Use Tab
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nutrient budget is provided in good faith, populated using the wailable science and expert option and adhering to the ulionary principle. Arcadis accept no responsibility from loss mage however incurred as a direct or indirect result of acting this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Types and Nutrient Loss Rates (CSD9A & CSD9B

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals) CSD9B (Urban)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calcs Summary						
	TN (kgN/yr)	TP (kgP/yr)				
Stage 1 - WwTW load	26767.7	321.2				
Stage 2 - existing agriculture landuse load	12103.0	204.5				
Stage 3 - proposed development landuse load	6647.1	336.7				

	Th (1	TO (herDherb
	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	26767.7	321.2
Step 2 (Stage 3 - Stage 2)	-5455.9	132.2
Step 3 (Step 1 + Step 2)	21311.8	453.4
Step 4 (= Step 3, i.e. N/P budget without buffer)	21311.8	453.4
Step 5 (Step 4*20%)	4262.4	90.7
Step 6 (Step 4 + Step 5)	25574.2	544.1
	25574.2	544.1

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Scenario 1) PCC (Scen		PCC (Scenario 1) PCC (Scenario 2)	
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Southern Water - Sellindge WwTW	28429	578	25574	544

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Sce	enario 1)	PCC (Scenario 2)		
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)	
Southern Water - Sellindge WwTW	30.6	48.2	27.5	45.	

Assumed Wetland TN removal rate Assumed Wetland TP removal rate 93 g/m2/yr 1.2 g/m2/yr 930 kg/ha/yr 12 kg/ha/yr

PCC Scenario 1

Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2

Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d





7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
Sellindge CSD9A	7.56	1.50	9.06	83%	188
Sellindge CSD9B	10.91	8.00	18.91	58%	162
CSD9A & 9B TOTAL	18.47	9.50	27.97		350

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTERPOOL FRAMEWORK MASTERPLAN

	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	183.6	
Total Urban Area in Framework Masterplan	350.5	
Total OP Framework Area Check	756.1	

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

Sellindge WwTW

Combined Land Use and WwTW Discharges Loading

Otterpool Nitrogen Budget - V1.8 - Sellindge WwTW - Otterpool FMP & Sellindge - Sensitivity Test.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC	
	Masterplan Framework (incl	
Development name	CSD9A & CSD9B)	
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/
Number of residential dwellings (Class C3)	9054	
Number of residential dwellings (Class C2)	1296	
Hotel Bedrooms (Class C1)	117	
Local Planning Authority	Folkstone and Hythe DC	

	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known)	Sellindge sewage works		Southern Water	
Total Nitrogen existing consent for this treatment works, if any, (if Known)	N/A	mg/l		
			Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	N/A	mg/l	Environment Agency	
			Environment Agency - this is indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Known	0.2	mg/l	accommodate Otterpool	Not Used in this Calcs as onsite WwTW is used instead
Total area of site		hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Total area of site	784.1	liectales	See Floposed Land Ose Tab	Olleipool Faik FiviF plus CSD9A & CSD9B
New Urban Area	308.0	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of designated Suitable Alternative Natural Space (SANG)/open space	254.10	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab	Otterpool Park FMP plus CSD9A & CSD9B
			Based on the habitat survey info	
			presented in the previous OP	
			Outline Planning Application in 2019, consultations with FHDC &	
			Land Agents etc. See Existing	
			Land Type Tab	
	A mixture of arable land, improved			
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below			
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

		A	Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	
Lowland Grazing Livestock	119.1	12.2	0.24	
Racetrack	13.5			Average of urban & lowland grazing livestock loss rates
		13.3	0.5	used.
Hay Cut	18.9	5	0.14	
Other Grassland/Greenfield	101.1	5	0.14	
Mixed area - Urban	11.5	14.3	0.83	
Mixed area - Greenfield	4.5	5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	
	613.4			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

			Average Nutrient Loss Rate
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)
CSD9B (Cereals)	17.16	27.3	0.36
CSD9B (Urban)	0.7	14.3	0.83
CSD9B (Other Grassland/greenfield)	1.05	5	0.14
CSD9A (Urban)	0.08	14.3	0.83
CSD9A (Other Grassland/greenfield)	8.98	5	0.14
	27.97		

2. Otterpool FM+CSD9A&B@110(S1)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
	Otterpool Park Garden Town - Masterplan		
Development Number of residential dwellings (Class C3)	Framework (incl CSD9A & CSD9B) 9054		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	9054		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Disease d	-		
Stage 1 Step 1 calculate additional population	Figures	Units/ Data source	Further information
Occupancy rate	24	Natural England recommendation	
Step 2 confirm water use (litres per person)	110	l/p/d Natural England recommendation - for resinential Class C1	
	350	l/p/d British Water recommendation - for residential Class C2	No allowance included for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	300 Sellindae WwTW	l/p/d British Water recommendation - for Hotel Class C1	No allowance include for Otterpool water efficiency measures
and permitted TN concentration	Sellindge WwTW	Southern Water mg/I Southern Water	N/A, Subject to review in 2022.
Permitted Total Phosphate concentration	1	mg/l Southern Water	Current Sellndae Permit TP.
·			
			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to achieve TN value of 25 mg/l as per SW advice received. However, a
Proposed permitted Total Nitrogen concentration to accommodate	25	mg/I Southern Water/NE	expect to achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required.
Proposed permitted Total Phosphate concentration to	20	nigh Southern Water/NE	use of MBR could potentially further lower this TN liquie if required.
Proposed permitted Total Phosphate concentration to accommodate Otterpool	0.3	ma/I Environment Agency	Proposed TP at Sellindge permit.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.3	ingn Einmonnfellt Agenty	rioposos nº de celinique permit.
exit the WwTW after treatment			
Additional population (Residential Class C3)	21729.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)	3110.4	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room
Additional population (Hotel Class C1) Wastewater volume generated by development	234	Persons litres/day	Assumed 2.0 Occupancy Raterper rount
	3049090	,	N/A, Subject to review in 2022. The currently proposed design at Sellindge
			expect to achieve TN value of 25 mg/l as per SW advice received. However, a
Receiving WwTW environmental permit for TN Receiving WwTW environmental permit for TP	25	mg/i TN mg/i TP	use of MBR could potentially further lower this TN figure if required. Used proposed EA TP permit level for Sellindge WwTW upgrade.
Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit	0.3	mg/I TP mg/I TN	Used proposed EA TP permit level for Sellindge WwTW upgrade. Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit	0.27	mg/I TP	reprise servicestori de la processoriary pasie.
TN discharged after WwTW treatment	79854660	mg/TN/day	
TP discharged after WwTW treatment	958255.92	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	29146.95 249.76	kg/TN/yr kg/TP/yr	
	040.10	-9· · · · ·	l
Stage 2	Figures	Units/ Data source	Further information
		Ecology Survey report reference/remote imagery	
	A mixture of arable land (i.e. Cereals/Lowland		
	Grazing Livestock), Hay Cut, Mixed and Other Grassland (see the breakdown in Table 2		
	below and 'Land Type Overview' Tab) - this		
	largely based on the habitat survey info		
	presented in the previous OP Outline Planning		
Current land use			
Current land use	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
	Application in 2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land		hoctares	Sellindge CSD9A & CSD9B Sites included separately based on available data . See Table 2A/2B & Input Data Tab
		hectares	
Total area of existing 'egricultural' and other land	641.4		
		hectares kgN/halyr	
Total area of existing 'egricultural' and other land	641.4		
Total area of existing 'agricultural' and other land Nitrate loss from current site land use Phosphate loss from current site land use	See Table 24/2B See Table 24/2B	kgN/halyr kn2/halyr	See Table 2A/2B & Input Data Tab
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Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 24 Evicting Land Tunna and Nutriani Lang Bates (Ottamon) Masterian Ever

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool masterplan					
		Average Nutrient Loss Rate Estimated Nutrient		ent loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14		14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutrie	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calcs Summary		
	TN (kgN/yr)	TP (kgP/yr)
Stage 1 - WwTW load	29147.0	349.8
Stage 2 - existing agriculture landuse load	12103.0	204.5
Stage 3 - proposed development landuse load	6079.8	294.6

Stage 4 - Net Change in Nitrogen and Phosphorous Budget		
	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	29147.0	349.8
Step 2 (Stage 3 - Stage 2)	-6023.2	90.1
Step 3 (Step 1 + Step 2)	23123.8	439.9
Step 4 (= Step 3, i.e. N/P budget without buffer)	23123.8	439.9
Step 5 (Step 4*20%)	4624.8	88.0
Step 6 (Step 4 + Step 5)	27748.5	527.9
	27748.5	527.9

Nitrogen/Phosphorous Budget with 20% buffer

3. Otterpool FM+CSD9A&B@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development Number of residential dwellings (Class C3)	Framework (incl CSD9A & CSD9B) 9054		
Number of residential dwellings (Class C3)	1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC	l de la constante de	
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate		Natural England recommendation l/p/d Natural England recommendation - for resinential Class C1	
Step 2 confirm water use (litres per person)	262.5	I/p/d_Natural England recommendation - for residential Class C1 I/p/d_British Water recommendation - for residential Class C2 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
	225	l/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Sellindge WwTW		
and permitted TN concentration Permitted Total Phosphate concentration	N/A 1	mg/l Southern Water mg/l Southern Water	N/A, Subject to review in 2022. Current Sellndae Permit TP.
			N/A. Subject to review in 2022. The currently proposed design at Sellindge expect to
Proposed permitted Total Nitrogen concentration to accommodate Otterpool		ma/l Southern Water/NE	achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required.
	25	mg/i Southern Water/NE	potentially further lower this TN figure if required.
Proposed permitted Total Phosphate concentration to accommodate Otterpool	03	mg/I Environment Agency	Proposed TP at Sellindoe permit.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.3	ingri Environment Agency	riopodeu ir al deminoje permit.
exit the WwTW after treatment		Persons	
Additional population (Residential Class C3) Additional population (Residential Class C2)		Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3259386	litres/day	
			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could
Receiving WwTW environmental permit for TN	25	mg/i TN mg/i TP	potentially further lower this TN figure if required.
Receiving WwTW environmental permit for TP	0.3	mg/I TP	Used proposed EA TP permit level for Sellindge WwTW upgrade.
90% of the proposed consent TN limit 90% of the proposed consent TP limit	0.27	mg/l TN mg/l TP	Applied 90% correction as a precautionary basis.
TN discharged after WwTW treatment	73336185	mg/TN/day	
TP discharged after WwTW treatment	880034.22	mg/TP/day	
Annual wastewater total nitrogen load Annual wastewater total phosphorous load	26767.71	kg/TN/yr kg/TP/yr	
Stage 2	Figures	Units/ Data source Ecology Survey report reference/remote imagery	Further information
	Cereals/Lowland Grazing	Ecology Survey report relevencementate imagery	
	Livestock), Hay Cut, Mixed and		
	Other Grassland (see the breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this		
	largely based on the habitat survey		
	info presented in the previous OP Outline Planning Application in		
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	641.4	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgNhalyr	
Nitrate loss from current site land use	See Table 24/2B	kgNihalyr	
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/vr	
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B 12102.96	knP/halyr kgNyr	See Table 2A/2B See Table 2A/2B
Phosphate loss from current sile land use Total nitrate loss from current land use Total Phosphate loss from current land use	See Table 2A/2B 12102.96 204.49	knPihaiyr KaNyr kgPiyr	See Table 2A/2B
Phosphate loss from current sile land use Tota initiale loss from current land use Total Phosphate loss from current land use Stage 3	See Table 2A/2B 12102.96 204.49 Figures	knP/halyr kgNyr kgPlyr units/ Data source	See Table 2A/2B Further information
Phosphate loss from current sile land use Tota rintrale loss from current land use Total Phosphet loss from current land use Stage 3 New urban area Urban area nitogen load	See Table 2A/2B 12102.96 204.49 Figures 308.0 14.3	knP/halyr kgNyr kgPyr kgPin hectares/site layout kokonsyr	See Table 2A/2B
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 2A/2B 12102.96 204.99 Figures 308.0 143.3 0.83	knP/hatyr kgP/yr kgP/yr tectares/site layout kgP/hatyr kgP/hatyr	See Table 2A/2B Further information
Phosphate loss from current sile land use Tota rintrale loss from current land use Total Phosphet loss from current land use Stage 3 New urban area Urban area nitogen load	See Table 2A/2B 12102.96 204.49 Figures 308.0 14.3	knP/hatyr kgP/yr kgP/yr tectares/site layout kgP/hatyr kgP/hatyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 2A/2B 12102.96 204.99 Figures 308.0 143.3 0.83	knP/hatyr kgP/yr kgP/yr tectares/site layout kgP/hatyr kgP/hatyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area	See Table 24/28 12102.96 204.49 Figures 14.3 0.83 4403.97	kmPhatyr kgNyr kgPfyr Inclareolvite layout kgNhatyr kgPhatyr kgPhatyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phospharous load from future urban area	See Table 24/28 12/102.36 204.49 Figures 14.3 0.83 4403.97 255.62	knP/ha/yr kgP/yr kgP/yr hectarea/site layout kgPlna/yr kgPha/yr kgPha/yr kgPlyr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlooen soace	See Table 24/28 12102.96 204.49 Figures 0.083 4403.97 2255.82 255.82	knP/hayr kgP/yr hectares/site layout kgVnayr kgP/nayr kgP/nyr kgP/yr	See Table 2A/2B Further information See Proposed Land Use Tab
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban anticipan load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG(open space SANG(open space) SANG(open space)	See Table 24/28 12102.96 204.49 Figures 0.83 4403.97 255.62 254.1 5	knP/hayr kgP/yr kgP/yr hectanesi-late layout kgP/hayr kgP/yr kgP/yr ha kgP/yr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodiand areas). See Input Data Tab
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Were urban area Urban area phosphate load What new phosphate load What new phosphate load Witrogen load from future urban area Phosphorous load from future urban area SANG/Open space introgen load SANG/Open space SANG/Open space	See Table 24/28 12102.96 204.49 Figures 4403.97 4403.97 255.62 254.1 5 0.14 1270.5	knP/hayr kgP/yr kgP/yr hectares/sile iayout RgNna/yr kgP/yr kgP/yr ha kgP/hayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodiand areas). See Input Data Tab
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Sitage 3 New urban area hirtogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous load from SANG/open space	See Table 24/28 204.49 Figures 0.03 4403.97 2255.82 255.82 255.82 255.1 5 0.14 1270.5 35.57	knP/ha/yr kgP/yr hectares/site layout kgP/na/yr kgP/na/yr kgP/yr ha kgP/ayr kgP/yr ha kgP/ayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Work untan area Urban area phosphate load Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space SANGlopen space Phosphorous load from SANG	See Table 24/28 12102.96 204.49 14.3 0.033 4403.97 205.62 255.62	knP/ha/yr kgP/yr kgP/yr hotares/sile layout kgP/na/yr kgP/nyr kgP/yr ha kgNha/yr kgP/yr ha ba ba	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodiand areas). See Input Data Tab
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 War utban area phosphate load Urban area phosphate load Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGiopen space SANGiopen space phosphorous load Nitrogen load SANGiopen space SANGiopen space phosphorous load Nitrogen load song of the SANGiopen space New Community Farm/Alidments area New Community Farm/Alidments antrogen load New Community Farm/Alidments antrogen load New Community Farm/Alidments antrogen load	See Table 24/28 12102.96 204.49 Figures 008.0 14.3 0.033 4403.97 205.62 254.1 5 0.24 255.7 0.44 255.7 0.44 255.7 0.44 0.	knP/havyr kgP/yr hccares/sile layout kgP/nayr kgP/nyr kgP/nyr kgP/yr ha kgP/nyr kgP/yr ha kgP/nyr kgP/yr ha kgP/nayr kgP/nyr ba kgP/nayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total initrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG(open space SANG(open space) new space Nature de from SANG(open space New Community Farm/Alictments area New Community Farm/Alictments space)	See Table 24/28 12/02.96 204.49 Figures 000 443 0.03 4403.97 2255.62 2254.1 5 0.14 1270.5 9.8 2255. 9.8 0.28 2.25 0.28 0.28 0.27 0.27 0.27 0.27 0.27 0.27 0.27 0.27	knPihayr kgNyr kgPlyr tectares/site layout kgNhayr kgNiyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNayr kgNayr kgNyr kgNyr kgNyr kgNyr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Nitrogen load from future urban area New SANGiopen space SANGiopen space nitrogen load SANGiopen space nitrogen load SANGiopen space phosphorous load Nitrogen Load from SANGiopen space New Community Farm/Alidments area New Community Farm/Alidments area New Community Farm/Alidments area	See Table 24/28 12102.96 204.49 Figures 003 4403.97 205.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 255.62 235.75 235.	knP/havyr kgP/yr hctares/sile layout kgP/nayr kgP/nyr kgP/yr ha kgNhavyr kgP/yr ha kgNhavyr kgP/yr ha kgP/nayr kgP/yr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed I and Use Tab Excluded proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Wew urban area Urban area hitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorocus load from future urban area New SANG/open space SANG/open space hitrogen load SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorotus Load from SANG/open space New Community Farm/Alditments area New Community Farm/Alditments area New Community Farm/Alditments introgen load Nettingen marking for the phosphorous load from New Community Farm/Alditments New Woodland from New Community Farm/Alditments	See Table 24/28 12102.96 204.49 Figures 4403.97 2255.62 25	knP/havyr kgP/yr wgP/yr hectares/site layout kgP/havyr kgP/hyr kgP/yr ha kgP/havyr kgP/yr ha hagyhavyr kgP/yr ha ha hayr kgP/myr kgP/yr ha ha hayr kgP/yr ha ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr hayr kgP/yr ha hayr kgP/yr hayr kgP/yr hayr kgP/yr hayr kgP/yr hayr kgP/yr hayr kgP/yr ha hayr kgP/yr hayr kgP/yr hayr kgP/yr hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr ha hayr kgP/yr hayr kgP/yr ha hayr kgP/yr hayr kgP/yr ha hayr kgP/yr hayr hayr hayr hayr hayr hayr hayr ha	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Wew urban area Whom area introgenical Urban area introgenical Urban area introgenical Nitrogen Load from future urban area Phosphorous load from future urban area New SANGlopen space SANGlopen space introgen load SANGlopen space introgen load SANGlopen space introgen load SANGlopen space introgen load SANGlopen space introgen load New Community Farm/Allotments area New Community Farm/Allotments New Community Farm/Allotments New Community Farm/Allotments New Community farm/Allotments New Community farm/Allotments	See Table 24/28 12102.96 204.49 Figures 083 4403.97 255.82 255.92 255.85	knP/hayr kpPyr kgP/yr hectersiale layout wgNhayr kgP/yr kgP/yr ha kgPhayr kgP/hyr ha kgPhayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr kgP/nayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed I and Use Tab Excluded proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGiopen space SANGiopen space nitrogen load SANGiopen space nitrogen load SANGiopen space phosphorous load Nitrogen Load from SANGiopen space Phosphorous load from SANGiopen space New Community FarmiAldiments area New Woodland Area phosphorous load New Woodland Area phosphorous load New Woodland Area phosphorous load New Woodland Marea Intogen load	See Table 24/28 12102.36 204.49 Figures 008.0 14.3 0.03 4403.97 2255.62 2254.1 5 0.14 1270.5 0.8 2255 0.2 24 255.62 255.6	knPhayr kgPlyr wgPlyr hoctares/site layout kgPhayr kgPhyr kgPhyr ha kgPhayr kgPhyr ha kgNhayr kgPyr ha kgNhayr kgPyr ha kgNyr kgPyr ha kgNayr kgPyr ha kgNayr kgPyr ha kgNayr kgPyr ha kgNayr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed I and Use Tab Excluded proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total Phosphate loss from current land use Total Phosphate loss from current land use Stage 3 Wew urban area Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANGiopen space SANGiopen space nitrogen load SANGiopen space nitrogen load SANGiopen space phosphorous load Nitrogen Load from SANGiopen space Phosphorous Load from SANGiopen space New Community Farm/Altichments area New Community Farm/Altichments area New Community Farm/Altichments Intogen load Nitrogen Load from SANGiopen space Phosphorous Load from SANGiopen space Phosphorous Load from SANGiopen space Phosphorous Load from New Community Farm/Altichments New Woodland New Woodland Area phosphorous load New Woodland	See Table 24/28 12102.36 Figures 4403.97 4403.97 2255.62 2264.1 5 0.14 1270.5 2264.1 5 0.14 1270.5 226.1 2	knP/hayr kgP/yr tgP/yr tgP/nyr tectares/site layout kgP/nayr kgP/nyr kgP/nyr kgP/nyr ha kgP/nayr kgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr kgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr ha KgP/nyr ha	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed I and Use Tab Excluded proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 We within area Urban area phosphate load Nitrogen load from future urban area New SANGiopen space SANGiopen space nitrogen load SANGiopen space phosphorous load Nitrogen Load from SANGiopen space Phosphorous load from SANGiopen space New Community Farm/Alditments area New Community Farm/Alditments area New Community Farm/Alditments area New Community Farm/Alditments Phosphorous load Nitrogen Load from SANGiopen space New Community Farm/Alditments Phosphorous load New Community Farm/Alditments Phosphorous load New Community Farm/Alditments New Yoodand Area phosphorous load New Woodand Area phosphorous load	See Table 24/28 12102.36 204.49 Figures 008.0 14.3 0.03 4403.97 2255.62 2254.1 5 0.14 1270.5 0.8 2255 0.2 24 255.62 255.6	knP/havyr kpP/yr kgP/yr hotares/sile isyout kgP/nayr kgP/hyr kgP/yr ha hayhnayr kgP/yr ha kgNinayr kgP/yr ha kgNinayr kgP/yr ha kgNinayr kgP/yr ha kgNinayr kgP/yr ha KgNinayr kgP/yr ha KgP/nyr kgP/yr	See Table 2A/2B Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting

upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framew

		Average Nutrient Loss Rate		Estimated Nutrie	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield Mixed area - Urban	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573 10	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutrie	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	17.16	27.3	0.36	468.47	6.18
CSD9B (Urban)	0.7	14.3	0.83	10.01	0.58
CSD9B (Other Grassland/greenfield)	1.05	5	0.14	5.25	0.15
CSD9A (Urban)	0.08	14.3	0.83	1.14	0.07
CSD9A (Other Grassland/greenfield)	8.98	5	0.14	44.90	1.26
	28.0			529.77	8.23

Stage 1 to Stage 3 Nutrient Loading Calcs Summary						
	TN (kgN/yr)	TP (kgP/yr)				
Stage 1 - WwTW load	26767.7	321.2				
Stage 2 - existing agriculture landuse load	12103.0	204.5				
Stage 3 - proposed development landuse load	6079.8	294.6				

tage 4 - Net Change in Nitrogen and Phosphorous Budg

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	26767.7	321.2	
Step 2 (Stage 3 - Stage 2)	-6023.2	90.1	
Step 3 (Step 1 + Step 2)	20744.5	411.4	
Step 4 (= Step 3, i.e. N/P budget without buffer)	20744.5	411.4	
Step 5 (Step 4*20%)	4148.9	82.3	
Step 6 (Step 4 + Step 5)	24893.4	493.6	
	24893.4	493.6	

Nitrogen/Phosphorous Budget with 20% buffer

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Southern Water - Sellindge WwTW	27749	528	24893	494

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Southern Water - Sellindge WwTW	29.8	44.0	26.8	41.1

Assumed Wetland TN removal rate	93 g/m2/yr
Assumed Wetland TP removal rate	1.2 g/m2/yr

930 kg/ha/yr 12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d

PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No
Sellindge CSD9A	7.56	1.50			, ,
Sellindge CSD9B	10.91	8.00	18.91	58%	
CSD9A & 9B TOTAL	18.47	9.50	27.97		

Ha Ha Excluded Retained Existing Land
Excluded Retained Existing Land
Existing community in framework masterplan area 71.0
Retained farmland in framework masterplan area 49.4
Existing Roads 10.0
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary 16.8 147.2
Excluded Mitigation Land From SANG
Wetlands 30 65
Woodland * 35
Community Farm/Allotment Land in current OPA boundary 9.8
Remaining Total SANG in Framework Masterplan* 244.6 I
Total Urban Area in Framework Masterplan 289.5
Total OP Framework Area Check 756.1

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.

(No)	
	188
	162
	350

enspace in development parcels

enspace in development parcels

Sellindge WwTW

Combined Land Use and WwTW Discharges Loading

Otterpool Nitrogen Budget - V1.8 - Sellindge WwTW - Otterpool FMP.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name	Folkstone and Hythe DC			
	Otterpool Park Garden Town -			
Development name	Masterplan Framework Only			
Development location (grid reference)	TR112 365	https://gridreferencefinder.com/		
Number of residential dwellings (Class C3)	8704			
Number of residential dwellings (Class C2)	1296			
Hotel Bedrooms (Class C1)	117			
Local Planning Authority	Folkstone and Hythe DC			
			D (0.11
Sewage treatment works that development drains to (if known)	Figures Sellindge sewage works	Units	Data source Southern Water	Guidance
Total Nitrogen existing consent for this treatment works, if any, (if Known)		mg/l	Southern Water	
rotal Nillogen existing consent for this treatment works, if any, (if Known)	N/A	ing/i	Southern Water - annual mean	
			currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	NI/A	mg/l	Phosphorous value is 1 mg/l	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	ing/i	Filospilorous value is 1 mg/i	
			Not available at present from the	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)	NI/A	mg/l	Environment Agency	
rotal Nillogen proposed consent for this treatment works, it any, (it Known)	IN/A	ing/i	Environment Agency - this is	
			indicative annual mean Total	
			Phosphorous value for the	
			proposed consent to	
Fotal Phosphorous proposed consent for this treatment works, if any, (if Know	0.3	mg/l	accommodate Otterpool	
Total area of site		hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
New Urban Area	250 5	ha atawa	One Descended and the Tab	Ottom and Dards EMD Order
New Urban Area	350.5	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of designated Suitable Alternative Natural Space (SANG)/open space	183.60	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
· · · · · ·				
Area of Community Farm/Allotments	9.8	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
			Based on the habitat survey info	
			presented in the previous OP	
			Outline Planning Application in	
			2019, consultations with FHDC &	
			Land Agents etc. See Existing	
	A mixture of arable land, improved		Land Type Tab	
	grassland & species poor semi-			
	improved grassland (see the			
Current land use	breakdown in Table 1 below			
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	1
Cereals	324.9	27.3	0.36	
Lowland Grazing Livestock	119.1	12.2	0.24	
Racetrack	13.5	13.3		Average of urban & lowland grazing livestock loss rates used.
Hay Cut	18.9	5	0.14	
Other Grassland/Greenfield	101.1	5	0.14	
Mixed area - Urban	11.5	14.3	0.83	
Mixed area - Greenfield	4.5	5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr) Phosphorous (kg P/ha/yr)		
CSD9B (Cereals)		27.3	0.36	
CSD9B (Urban)		14.3	0.83	
CSD9B (Other Grassland/greenfield)		5	0.14	
CSD9A (Urban)		14.3	0.83	
CSD9A (Other Grassland/greenfield)		5	0.14	

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA Land use is included).

2. Otterpool FM@110(S1)

New development nitrogen budget Client Development Number of residential dwellings (Class C3) Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1) Local Planning Authority Stage 1 Step 1 calculate additional population Occupancy rate Step 2 confirm water use (litres per person) Units/ Data source Further information Figures 2.4 Natural England recommendation 110 lipid Natural England recommendation - for resinential Class C1 300 lipid British Water recommendation - for residential Class C2 300 lipid British Water recommendation - for Hotel Class C1 Sellinge WartW Southen Water NA mg1 Southem Water No allowance included for Otterpool water efficiency measures No allowance include for Otterpool water efficiency measures Step 3 confirm Waste water Treatment Works (WwTW) and permitted TN concentration Permitted Total Phosphate concentration N/A, Subject to review in 2022. Current SelIndge Permit TP. N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required. Proposed permitted Total Nitrogen concentration to accommodate Otterpool 25 mg/l Southern Water/NE Otterpool Proposed permitted Total Phosphate concentration to accommodate Otterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would exit the VwTW after treatment Additional population (Reisidential Class C3) Additional population (Reisidential Class C1) Additional population (Hed Class C1) Wastewater volume generated by development 0.3 mg/l Environment Agency oposed TP at Sellindge permit. Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room 20889.6 Persons 3110.4 Persons 234 Persons 3456696 litres/day NA, Subject to review in 2022. The currently proposed design at Sellindge expect to achieve TN value of 25 mg/l as per SW advice received. However, a use of NBR could potentially further lower this TN spure if required. Used proposed EA TP permit level for Sellindse WwTW upgrade. Applied 90% concertion as a pre-acutionary basis. Receiving WwTW environmental parmit for TN Receiving WwTW environmental parmit for TP 90% of the proposed consent TN limit 90% of the proposed consent TP limit TN discharged after WwTW treatment TP discharged after WwTW treatment Annual wastewater total infoen load Annual wastewater total phosphorous load 25 mg/l TN 0.3 mg/l TP 22.5 mg/l TN 0.27 mg/l TP 77775660 mg/TN/day 933307.92 mg/TP/day 28388.12 kg/TN/yr 340.66 kg/TP/yr Figures Ecology Survey report reference Units/ Data source Further information Stage 2 A mixture of arable land (i.e. Cereals/Lowlan Grazing Livestock), Hay Cut, Mixed and Othe Grassland (see the breakdown in Table 2 elow and 'Land Type Overview' Tab) - this rrent land use indge CSD9A & CSD9B Sites included separately based on available data Total area of existing 'agricultural' and other land 613.4 hectares See Table 2A/2B & Input Data Tab Nitrate loss from current site land use e Table 2A/2B kgN/ha/yr Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use knP/ha/yr 11573.19 kgN/yr 196.26 kgP/yr See Table 2A/2B See Table 2A/2B Further information See Proposed Land Use Tab Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area units/ Data source 350.5 hectares/site layout 14.3 kgN/ha/yr 0.83 kgP/ha/yr 5012.15 kgN/yr Phosphorous load from future urban area 290.92 kgP/yr Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab for details. New SANGiopen space SANGiopen space intrast liability of the second SANGiopen space phosphorus is dad SANGiopen space phosphorus is dad Nitrogen Lad from SANGiopen space Phosphorus Load from SANGiopen space New Community Farmi/Altornets are New Community Farmi/Altornets Phosphorus Load from Community Farmi/Altornets Phosphorus Load from Community Farmi/Altornets New Woodland, Area nitrosen Load 183.6 ha 5 kgN/ha/yr 0.14 kgP/ha/yr 918 kgN/yr 25.70 kgP/yr 25.70 kgP/yr 9.8 ha 23.5 kgN/ha/yr 0.28 kgP/ha/yr 230.30 kgN/yr 2.74 kgP/yr 35 ha 5 kgN/ha/yr 0.02 kgP/ha/yr 175 kgN/yr ee Input Data Tab and Proposed Land Use Tab for details. See Proposed Land Use Tab New Woodland New Woodland Area nitrogen load New Woodland Area phosphorous load Nitrogen Load from New Woodland Phosphorous Load from New Woodland Combined nitrogen load from future land uses Combined phosphorous load from future land uses 6335.45 kgN/yr 320.06 kgP/yr

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss Rate		Estimated Nutrie	ant loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutrient loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD98 (Cereals) CSD98 (Urban)	0	27.3	0.36	0.00	0.00
	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
* Note that Sellindge Sites are not applicapable for this calculate	tion sheet purpose (i.e. only OFMA is included).				

Stage 1 to Stage 3 Nutrient Loading Gales Summary		
	TN (kgN/yr)	TP (kgP/yr)
Stage 1 - WwTW load	28388.1	340.7
Stage 2 - existing agriculture landuse load	11573.2	196.3
Stage 3 - proposed development landuse load	6335.5	320.1

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	28388.1	340.7	
Step 2 (Stage 3 - Stage 2)	-5237.7	123.8	
Step 3 (Step 1 + Step 2)	23150.4	464.5	
Step 4 (= Step 3, i.e. N/P budget without buffer)	23150.4	464.5	
Step 5 (Step 4*20%)	4630.1	92.9	
Step 6 (Step 4 + Step 5)	27780.5	557.3	

trogen/Phosphorous Budget with 20% buffer

3. Otterpool FM@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	Town - Masterplan Framework Only		
Number of residential dwellings (Class C3)	8704		
Number of residential dwellings (Class C2)	1296		
Hotel Bedrooms (Class C1)	117 Folkstone and Huthe DC		
Local Planning Authority	Folkstone and Hythe DC	1	
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			
Occupancy rate Step 2 confirm water use (litres per person)	2.4	Natural England recommendation l/p/d Natural England recommendation - for resinential Class C1	
Step 2 commit water use (intes per person)	262.5	l/p/d British Water recommendation - for residential Class C1	75% of the BW value assumed to account for Otterpool water efficiency measures
		l/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Sellindge WwTW	Southern Water	
and permitted TN concentration	N/A	mg/I Southern Water	N/A, Subject to review in 2022.
Permitted Total Phosphate concentration	1	mg/I Southern Water	Current SelIndge Permit TP.
Proposed permitted Total Nitrogen concentration to accommodate			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could
Otterpool	25	mg/l Southern Water/NE	potentially further lower this TN figure if required.
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool	0.3	mg/I Environment Agency	Proposed TP at Sellindge permit.
Step 4 calculate Total Nitrogen (TN) in kg per annum that would		· ·	
exit the WwTW after treatment			
Additional population (Residential Class C3) Additional population (Residential Class C2)	20889.6	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)	3110.4	Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3166986	litres/day	
			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to
Receiving WwTW environmental permit for TN		mg/l TN	achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required.
Receiving WwTW environmental permit for TP	25	mg/iTN mg/iTP	Used proposed EA TP permit level for Sellindge WwTW upgrade.
90% of the proposed consent TN limit	22.5	mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit	0.27	mg/I TP	
TN discharged after WwTW treatment TP discharged after WwTW treatment	71257185	mg/TN/day mg/TP/day	
Annual wastewater total nitrogen load	26008.87	mg/TP/day ko/TN/vr	
Annual wastewater total his ogen load	312.11	kg/TP/yr	
Stage 2			
Stage 2	Figures A mixture of arable land (i.e.	Units/ Data source Ecology Survey report reference/remote imagery	Further information
	Cereals/Lowland Grazing		
	Livestock), Hay Cut, Mixed and		
	Other Grassland (see the breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this		
	largely based on the habitat survey		
	info presented in the previous OP		
Current land use	Outline Planning Application in 2019		
Current land use	2019.		Sellindge CSD9A & CSD9B Sites included separately based on available data .
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Nitrate loss from current site land use	See Table 2A/2B	kgNhalyr	
Nitrate loss from current site land use	See Table 24/28	kgNihaiyr	
Nitrate loss from current site land use	See Table 24/28 See Table 24/28		
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B	knP/halyr knNvr	See Table 24/28
Phosphate loss from current site land use	See Table 2A/2B	knP/ha/vr	See Table 24/28 See Table 24/28
Phosphate loss from current site land use Tota infrate loss from current land use Total Phosphate loss from current land use Stage 3	See Table 24/28 11573.19 196.26 Figures	knP/halyr kgNyr kgP/yr units/ Data source	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area	See Table 2A/2B 11573.19 196.26 Figures 350.5	knP/halyr kqNyr kgP/yr hectares/site layout hectares/site layout	See Table 2A/2B
Phosphate loss from current sile land use Tota nitrate loss from current land use Total Phosphetices from current land use Stage 3 New urban area Urban area mitogen load	See Table 2A/2B 11573.19 196.26 Figures 350.5 14.3	knP/halyr kgNyr kgPyr kgPyr hectares/site layout kgNhalyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/2B 11573.19 196.25 Figures 350.5 14.3 0.83	knP/halyyr kqNlyr kgPlyy hctareufsite layout kqNhalyr kgPhalyr	See Table 2A/2B Further information
Phosphate loss from current sile land use Tota nitrate loss from current land use Total Phosphetices from current land use Stage 3 New urban area Urban area mitogen load	See Table 2A/2B 11573.19 196.26 Figures 350.5 14.3	knP/halyyr kqNlyr kgPlyy hctareufsite layout kqNhalyr kgPhalyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/2B 11573.19 196.25 Figures 350.5 14.3 0.83	knP/halyyr kqNlyr kgPlyy hctareufsite layout kqNhalyr kgPhalyr	See Table 2A/2B Further information
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load	See Table 24/28 111973.19 196.28 Figures 14.3 083 5012.15	knPihalyr kgNyr kgPyr hectaras/site layout kgNhalyr kgPihalyr kgNhalyr	See Table 2A/2B Further information
Phosphate loss from current sile land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area Urban area Urban area Urban area Urban area Phosphorous load from future urban area Phosphorous load from future urban area	See Table 24/28 111973 19 196.28 Figures 250.5 14.3 0.83 5012.15 200.92	knPhalyr kgNyr kgPyr hectaras/site layout kgNhalyr kgPhalyr kgPhalyr kgPyr	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Droban area phosphate load Withan area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/coen space	See Table 24/28 11573.19 196.26 14.3 0.83 5012.15 290.92 183.6	knPihalyr kgNyr kgPlyr tectarea/site layout kgNhalyr kgPhayr kgPlyr ha	See Table 2A/2B Further information
Phosphate loss from current sile land use Total nitrate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/open space SANG/open space	See Table 24/28 111973-19 196.28 196.28 196.28 196.28 197.28 5012-15 200.92 183.6 5 5 5	knPhalyr kgNyr kgPyr hectares/site layout kgNhalyr kgPhalyr kgPhalyr kgPyr ha kgNayr	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab
Phosphate loss from current site land use Total initiate loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Droban area phosphate load Withan area phosphate load Nitrogen load from future urban area Phosphorous load from future urban area New SANG/coen space	See Table 24/28 11573.19 196.26 14.3 0.83 5012.15 290.92 183.6 5 0.14	knPihaiyr kgNyr kgPlyr tectarea/site layout kgNhaiyr kgPhayr kgPlyr ha kgPhyr ha kgNayr	See Table 2A/2B Further Information See Proposed Land Use Tab Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input Data Tab
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Phosphate loss from current site land use Total initial loss from current land use Total Phosphate loss from current land use Stage 3 New urban area Urban area nitrogen load Urban area phosphate load Nitrogen load from future urban area Phosphorocus load from future urban area New SANG/open space SANG/open space nitrogen load SANG/open space nitrogen load SANG/open space phosphorous load Nitrogen Load from SANG/open space Phosphorous load from SANG/open space New Community Farmi/Aldiments Phosphorous load from SANG/open space Phosphorous load from SANG/open space New Community Farmi/Aldiments Phosphorous load from SANG/open space New Community Farmi/Aldiments Phosphorous load from New Community Farmi/Aldiments Phosphorous load from New Community Farmi/Aldiments New Woodland Area phosphorous load New Woodland Area phosphorous load New Woodland Mene Introgen Iod	See Table 2A/28 11973.19 196.28 Figures 350.5 14.3 003 5012.15 290.92 183.6 0.14 9015 0.28 0.28 0.28 0.28 0.28 0.28 0.29 0.22 0.20 0.27 0.00 0.27 0.00 0.27 0.00 0.27 0.00 0.27 0.00	knPihalyr kgPlyr units/ Data source hectareal/site layout kgPihalyr kgPhayr kgPlyr ha kgNalyr kgPlyr ha kgNalyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr kgNyr	See Table 24/28 Further information See Proposed Land Use Tab Excluded proposed mitigation areas (i.e. Wetland & Woodland areas). See Input Data Tal and Proposed Land Use Tab for details. See Input Data Tab and Proposed Land Use Tab for details.

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framework)

		Average Nutrient Loss Rate		Estimated Nutrie	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/halyr)	Phosphorous (kg P/halyr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Other Grassland/Greenfield Mixed area - Urban Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

ng Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

	Average Nutrient Loss Rate		Estimated Nutri	ent loss	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD98 (Cereals) CSD98 (Urban)	0	27.3	0.36	0.00	0.00
	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

Stage 1 to Stage 3 Nutrient Loading Calcs Summary			
	TN (kgN/yr)	TP (kgP/yr)	
Stage 1 - WwTW load	26008.9	312.1	
Stage 2 - existing agriculture landuse load	11573.2	196.3	
Stage 3 - proposed development landuse load	6335.5	320.1	
Stage 4 - Net Change in Nitrogen and Phosphorous Budget			
stage 4 - Net change in Nitrogen and Phospholous Dudget			
	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	26008.9	312.1	
Step 2 (Stage 3 - Stage 2)	-5237.7	123.8	
Step 3 (Step 1 + Step 2)	20771.1	435.9	
Step 4 (= Step 3, i.e. N/P budget without buffer)	20771.1	435.9	
Step 5 (Step 4*20%)	4154.2	87.2	
Step 6 (Step 4 + Step 5)	24925.4	523.1	
	24925.4	523.1	
	24323.4	523.1	
Nitrogen/Phosphorous Budget with 20% buffer			

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Southern Water - Sellindge WwTW	27780	557	24925	523

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Scenario 1)		PCC (Sce	nario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Southern Water - Sellindge WwTW	29.9	46.4	26.8	43.6

Assumed Wetland TN removal rate	93 g/m2/yr
Assumed Wetland TP removal rate	1.2 g/m2/yr

930 kg/ha/yr 12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d

PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

7. Proposed Land Use

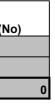
	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No
Sellindge CSD9A					
Sellindge CSD9B					
CSD9A & 9B TOTAL	0	0.00	0		

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTEI	RPOOL FRAMEWORK MASTERPL	<u>AN</u>
	На	Ha
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	183.6	
Total Urban Area in Framework Masterplan	350.5	
Total OP Framework Area Check	756.1	

*note leachate loads from woodland is calculated separately instead of SANG leachate rates.



Sellindge WwTW

Combined Land Use and WwTW Discharges Loading

Otterpool Nitrogen Budget - V1.8 - Sellindge WwTW -Otterpool FMP - Sensitivity Test.xlsx

1. Input Data

Indicative nitrogen budget for new development - Scoping data

Client name Development name Development location (grid reference) Number of residential dwellings (Class C3) Number of residential dwellings (Class C2) Hotel Bedrooms (Class C1) Local Planning Authority	Folkstone and Hythe DC Otterpool Park Garden Town - Masterplan Framework Only TR112 365 8704 1296 117 Folkstone and Hythe DC	https://gridreferencefinder.com/		
	Figures	Units	Data source	Guidance
Sewage treatment works that development drains to (if known) Total Nitrogen existing consent for this treatment works, if any, (if Known)	Sellindge sewage works N/A	mg/l	Southern Water Southern Water - annual mean currently consented Total	
Total Phosphorous existing consent for this treatment works, if any, (if Known)	N/A	mg/l	Phosphorous value is 1 mg/l	
Total Nitrogen proposed consent for this treatment works, if any, (if Known)		mg/l	Not available at present from the Environment Agency Environment Agency - this is indicative annual mean Total Phosphorous value for the proposed consent to	
Total Phosphorous proposed consent for this treatment works, if any, (if Know Total area of site		mg/l hectares	accommodate Otterpool See Proposed Land Use Tab	Otterpool Park FMP Only
New Urban Area	289.5	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of designated Suitable Alternative Natural Space (SANG)/open space	244.60	hectares	See Proposed Land Use Tab	Otterpool Park FMP Only
Area of Community Farm/Allotments	9.8 A mixture of arable land, improved grassland & species poor semi- improved grassland (see the		See Proposed Land Use Tab Based on the habitat survey info presented in the previous OP Outline Planning Application in 2019, consultations with FHDC & Land Agents etc. See Existing Land Type Tab	Otterpool Park FMP Only
Current land use	breakdown in Table 1 below			
nitrate loss from current site land use	See Table 1 below	kgN/ha/yr		

Table 1A - Existing Land Types and Nutrient Loss Rates (Otterpool Framework Masterplan)

			Average Nutrient Loss Rate	
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
Cereals	324.9	27.3	0.36	
Lowland Grazing Livestock	119.1	12.2	0.24	
				Average of urban & lowland grazing livestock loss rates
Racetrack	13.5			
		13.3	0.5	used.
Hay Cut	18.9	5	0.14	
Other Grassland/Greenfield	101.1	5	0.14	
Mixed area - Urban Mixed area - Greenfield	11.5	14.3	0.83	
	4.5	5	0.14	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	
	613.4			

See 'Existing Land Type Overview' tab for further detail .

	Hectares
Remaining existing area within Otterpool Framework boundary excluded from	
the NN Assessment (i.e. 71 ha existing community, 54.9 ha retained farmland	
& 16.8 ha retained buildings/waterbodies/woodland/ hedgerows/ other	
ecological features)	142.7

Table 1B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	
CSD9B (Cereals)		27.3	0.36	
CSD9B (Urban)		14.3	0.83	
CSD9B (Other Grassland/greenfield)		5	0.14	
CSD9A (Urban)		14.3	0.83	
CSD9A (Other Grassland/greenfield)		5	0.14	

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA Land use is included).

2. Otterpool FM@110(S1)

Summer Fabres of Headers Restrict of Headers (Fabre (Fab	New development nitrogen budget			
Data series Function of the series of the seri	Client	Folkstone and Hythe DC		
		Framework Only		
	Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)			
Tayle York Dubbits conv Problem in the second of the s	Hotel Bedrooms (Class C1)			
Bit I contact street in the spectra in the	Local Planning Authority	Folkstone and Hythe DC		
Operating the set of	Stage 1	Figures	Units/ Data source	Further information
bin 2 control source (speep open) bin 2 control so	Step 1 calculate additional population	-		
Image: Source in the set in				
Bis 1. Source stratement (Note where Thement Note where The	otop z commini water abe (mees per person)	350	I/p/d British Water recommendation - for residential Class C2	
Ind genetic field construction Prove the field construction Prov				No allowance include for Otterpool water efficiency measures
Purchase Construction Particle Ingli Source construction	and permitted TN concentration	Seilindge ww.i.w	southern Water mol Southern Water	N/A Subject to review in 2022
Report Intervention Approximation Approximation <td></td> <td>1</td> <td>mg/l Southern Water</td> <td></td>		1	mg/l Southern Water	
Report Intervention Approximation Approximation <td></td> <td></td> <td></td> <td>N/A Subject to review in 2022. The currently proposed design at Sellindge</td>				N/A Subject to review in 2022. The currently proposed design at Sellindge
Page of the Standard User Streem is a second of the Standard Us				expect to achieve TN value of 25 mg/l as per SW advice received. However, a
lacenseta departed in the present in the ends in the second depart of a second depart of		25	mg/l Southern Water/NE	use of MBR could potentially further lower this TN figure if required.
Bit - Line -	Proposed permitted Total Phosphate concentration to		mal Facilitation to Associa	Proposed TR at Sollindae permit
lat he Vir den statuet Active de version (Case Ci) Active de version (Section (Sec	Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.3	mg/i Environment Agency	Proposed TP at Seminoge permit.
Additional production (Section			_	
Additional production (field Class C1) Additional production (field Class C1) Additi	Additional population (Residential Class C3) Additional population (Residential Class C2)	20889.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Reading Work intermenting parties for the second	Additional population (Hotel Class C1)	234	Persons	Assumed 2.0 Occupancy Rate/per room
Reading WYW information and in The Provide State	Wastewater volume generated by development	3456696	litres/day	N/A Subjection environment 2000 The support of second design of Selfinder
Bacheng WT W environmenia pare to Th Bacheng WT W environmenia pare to The Bacheng MT W				expect to achieve TN value of 25 mg/l as per SW advice received. However, a
Only of the proposed conset TV inits (b) of the proposed conset the proposed conset TV inits (b) of the proposed conset T	Receiving WwTW environmental permit for TN	25	mg/I TN	use of MBR could potentially further lower this TN figure if required.
Sind off proceed covers IT limit the Scharge dark WY between and a wateries for the Scharge Annal wateries for the Scharge A	Receiving WwTW environmental permit for TP 90% of the proposed consent TN limit	0.3	mg/ITP mg/ITN	Used proposed EA TP permit level for Sellindge WwTW upgrade. Applied 90% correction as a precautionary basis
The decay and state with the independent decay independent independent de	90% of the proposed consent TP limit	0.27	mg/ TP	replica con concolor as a production y basis.
Annual weekeekee total integrations and diverse weekeekeek total integrations and diverse weekeekeekeekeekeekeekeekeekeekeekeekeek	TN discharged after WwTW treatment	77775660	mg/TN/day mg/TR/day	
Annual weeker bital photophone, load Figure Index bases Parties' information Step 2 Figure 3 Figure 3 Endog Survey report inference/amounds imagery Parties' information Current land use Company Survey Surv	Annual wastewater total nitrogen load	20200 12	ka/TN/sr	
Current land use A relative of shall use (1, 8, 0 center). Use of shall use (1, 8, 0 cente)	Annual wastewater total phosphorous load	340.66	kg/TP/ýr	
Current land use A relative of shall use (1, 8, 0 center). Use of shall use (1, 8, 0 cente)	Stage 2	Figures	Units/ Data source	Further information
Current land use Outsing Lendowsky, My Cut, Made and Other Desidewing My Streament Desidewing My Streament Presented in the presented in the presented in Public Presented in the previous OP Culture Presented in the previous OP Culture Previous Previous OP Culture Previous OP Cul			Ecology Survey report reference/remote imagery	
Current land use Description failed Sprocesser Table 7000000000000000000000000000000000000		A mixture of arable land (i.e. Cereals/Lowland Grazing Livestock) Hay Cut Mixed and Other		
Current land use Figure band on the hadds as were years presented in the previous OP oblights Parmong Ageliadion in 211 Parmong Ageliadion Ageliadion in 211 Par		Grassland (see the breakdown in Table 2		
Current land use Persinited in the personal OP Colling Pensinite Academia CP Colling Pensinite Academia Pensinite Academia Pensinite Academia Academia Pensinite Academia Academia Pensinite Academia Academia Pensinite Academia Pensinite Academia Pensinite Academia Pensoaet Academia Pensinite Academia Pensoaet Academia Pensinite Acade		below and 'Land Type Overview' Tab) - this		
Table area of existing 'agricultural' and other land Bit A Bit A Bot A Bit A<		presented in the previous OP Outline		
Nitzelios fon current sile land use Phosphale loss fon current sile land use Phosphale loss fon current sile land use Tai al inteles loss fon future urban area Al 133 lag/hay's Nirogen loss fon future urban area Al 133 lag/hay's Nirogen loss fon future urban area Al 133 lag/hay's Nirogen loss fon future urban area Al 134 lag/hay's Nirogen loss fon future urban area Al 135 lag/hay's Nirogen loss fon formal/farmi/fa	Current land use	Planning Application in 2019.		
Nitzelios fon current sile land use Phosphale loss fon current sile land use Phosphale loss fon current sile land use Tai al inteles loss fon future urban area Al 133 lag/hay's Nirogen loss fon future urban area Al 133 lag/hay's Nirogen loss fon future urban area Al 133 lag/hay's Nirogen loss fon future urban area Al 134 lag/hay's Nirogen loss fon future urban area Al 135 lag/hay's Nirogen loss fon formal/farmi/fa				
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Prosphate loss from current land use Total Prosphate loss from current land use Figures units/ Data source Purther information Stage 3 Figures units/ Data source Purther information War ubna area (Ubna marea phosphate load Nitrogen load from future urban area 2428 bectaresistile layout See Proposed Land Use Tab Phosphate load from future urban area Nitrogen load from future urban area 2402.02 kgPNar Excluded proposed miligation areas (i.e. Wetland & Woodland areas). See Input See Proposed Land Use Tab Phosphorous load from future urban area New SANGlopen space Now SANGlopen space Now Community Farm/Allotments introgen load Net open introgen load (1221 kgPNar) See Proposed Land Use Tab Wetland & Woodland areas). See Input Data Tab and Proposed Land Use Tab of details. New Community Farm/Allotments introgen load Net community Farm/Allotments introgen				
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Urban area nitrogen load 11.3 kgNhayr intermediate in the intermediate intermediate in the intermediate	Stage 3	Figures	units/ Data source	Further information
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New Community Family/lifements phosphorous load 0.28 kg/Pha/yr Nitrogen Load from Community Family/lifements 22.03 kg/Nyr Phosphorous Load from New Woodland 27.4 kg/Pyr New Woodland Area nitrogen load 5 kg/Na/yr New Woodland Area nitrogen load 5 kg/Na/yr New Woodland Area nitrogen load 0.02 kg/Pha/yr Nitrogen Load from New Woodland 0.02 kg/Pha/yr Nitrogen Load from New Woodland 0.02 kg/Pha/yr Combined Informace Intogen load from New Woodland 0.07 kg/Pha/yr	New Community Farm/Allotments area			See input Data Tab and Proposed Land Use Tab for details.
Phosphorous Lad from New Community Fam/Allotments 2.74 kgPyr New Woodland Area nitrogen load 35 ha New Woodland Area nitrogen load 5 kgNha/yr New Woodland Area nitrogen load 0.02 kgPha/yr Nitrogen Load from New Woodland 175 kgNyn Phosphorous Load from New Woodland 0.70 kgPha/yr Combined nitrogen load from New Woodland 9.79 kgPha/yr				
New Woodland Area nitrogen load 38 ha See Proposed Land Use Tab New Woodland Area nitrogen load 6 kg/Nhayr All See Proposed Land Use Tab New Woodland Area phosphorus load 0.02 kg/Phayr All See Proposed Land Use Tab New Woodland Area phosphorus load 0.02 kg/Phayr All See Proposed Land Use Tab Wroden Load from New Woodland 173 kg/Nyr All See Proposed Land Use Tab Ornipin dhroson Load from New Moodland 0.70 kg/Pyr All See Proposed Land Use Tab Ornipin dhroson Load from New Moodland 0.70 kg/Pyr All See Proposed Land Use Tab	New Community Farm/Allotments phosphorous load	0.28	kgP/ha/yr	
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Nitogen Load from New Woodland 175 kqN/yr Phosphorous Load from New Woodland 0.70 kgP/yr Combined nitrosen load from flute land uses 576.81 kg N/yr	New Community Farm/Allotments phosphorous load Nitrogen Load from Community Farm/Allotments Phosphorous Load from New Community Farm/Allotments New Woodland	0.28 230.30 2.74 35	kgNyr kgP/yr ha	See Proposed Land Use Tab
Phospharous Lead from New Woodland 0.70 kgP/yr Combined nitrogen load from future land uses 5768.15 kgN/yr	New Community Farm/Allotments phosphorous load Nitrogen Load from Community Farm/Allotments Phosphorous Load from New Community Farm/Allotments New Woodland New Woodland Area nitrogen load	0.28 230.30 2.74 35 5	kgNyr kgPyr ha kgNhalyr	See Proposed Land Use Tab
Combined nitrogen load from future land uses 5768.15 kgNyr Combined phosphorous load from future land uses 277.97 kgPyr	New Community Farm/Allotments phosphorous load Nitrogen Load from Community Farm/Allotments Phosphorous Load from New Community Farm/Allotments New Woodland New Woodland Area nitrogen load New Woodland Area phosphorous load	0.28 230.30 2.74 35 5 0.02	kgNyr KgPlyr ha kgNhalyr KgPhaly	See Proposed Land Use Tab
Combined phosphorous load from future land uses 27737 [kgPyr	New Community Fami/Allotiments phosphorous load Nitrogen Load from Community Fami/Allotiments Phosphorous Load from New Community Fami/Allotiments New Woodland Area nitrogen load New Woodland Area phosphorous load Nitrogen Load from New Woodland	028 230.30 2.74 35 5 0.02 175	kgNyr KgPyr ha KgNhayr KgPhayr	See Proposed Land Use Tab
	New Community Fami/Altothments phosphorous load Nitrogen Load from New Community Fami/Altothments New Woodland Area nitrogen load New Woodland Area nitrogen load New Woodland Area nitrogen load New Woodland Area nitrogen load Nitrogen Load from New Woodland Phosphorous Load from New Woodland	0.28 200.30 2.74 35 5 0.02 175 0.70	kgNyr KgPyr ha KgPhayr KgPhayr KgPhayr KgPyr	See Proposed Land Use Tab

Disclaimer:

This nutrient budget is provided in good faith, populated using the best available science and expert option and adhering to the precautionary principle. Arcadis accept no responsibility from loss or damage however incurred as a direct or indirect result of acting upon this nitrogen budget and the figures contained herein.

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Masterplan Framewor

		Average Nutrient Loss Rate		Estimated Nutri	ent loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	
Mixed area - Greenfield	4.5	5	0.14	22.50	
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

Table 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

		Average Nutrient Loss Rate		Estimated Nutr	ient loss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
* Note that Sollindae Sites are not applicanable for this calcula	stion sheet purpose (i.e. only OEMA is included)				

Note that Seminuge Sites are not applicabable for

Stage 1 to Stage 3 Nutrient Loading Calcs Summary				
	TN (kgN/yr)	TP (kgP/yr)		
Stage 1 - WwTW load	28388.1	340.7		
Stage 2 - existing agriculture landuse load	11573.2	196.3		
Stage 3 - proposed development landuse load	5768.2	278.0		

	TN (kgN/yr)	TP (kgP/yr)
Step 1 (Stage 1)	28388.1	340.7
Step 2 (Stage 3 - Stage 2)	-5805.0	81.7
Step 3 (Step 1 + Step 2)	22583.1	422.4
Step 4 (= Step 3, i.e. N/P budget without buffer)	22583.1	422.4
Step 5 (Step 4*20%)	4516.6	84.5
Step 6 (Step 4 + Step 5)	27099.7	506.8

trogen/Phosphorous Budget with 20% buffer

3. Otterpool FM@110(S2)

New development nitrogen budget			
Client	Folkstone and Hythe DC		
Development	Town - Masterplan Framework Only		
Number of residential dwellings (Class C3) Number of residential dwellings (Class C2)	8704 1296		
Hotel Bedrooms (Class C1)	117		
Local Planning Authority	Folkstone and Hythe DC		
Stage 1	Figures	Units/ Data source	Further information
Step 1 calculate additional population			r di dier information
Occupancy rate	2.4	Natural England recommendation	
Step 2 confirm water use (litres per person)	110	l/p/d Natural England recommendation - for resinential Class C1 l/p/d British Water recommendation - for residential Class C2 (adjusted to 75%)	
	262.5	l/p/d British Water recommendation - for residential Class C2 (adjusted to 75%) l/p/d British Water recommendation - for Hotel Class C1 (adjusted to 75%)	75% of the BW value assumed to account for Otterpool water efficiency measures 75% of the BW value assumed to account for Otterpool water efficiency measures
Step 3 confirm Waste water Treatment Works (WwTW)	Sellindge WwTW	Southern Water	
and permitted TN concentration Permitted Total Phosphate concentration	N/A	mg/l Southern Water mg/l Southern Water	N/A, Subject to review in 2022. Current Sellndge Permit TP.
Permitted Total Phosphate concentration		mg/i Southern water	N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to
Proposed permitted Total Nitrogen concentration to accommodate			achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could
Otterpool	25	mg/I Southern Water/NE	potentially further lower this TN figure if required.
Proposed permitted Total Phosphate concentration to			
accommodate Otterpool Step 4 calculate Total Nitrogen (TN) in kg per annum that would	0.3	mg/I Environment Agency	Proposed TP at Sellindge permit.
exit the WwTW after treatment			
Additional population (Residential Class C3)	20889.6	Persons	Assumed 2.4 Occupancy Rate/per dwelling
Additional population (Residential Class C2) Additional population (Hotel Class C1)	3110.4	Persons Persons	Assumed 2.4 Occupancy Rate/per dwelling Assumed 2.0 Occupancy Rate/per room
Wastewater volume generated by development	3166986	litres/day	
			N/A, Subject to review in 2022. The currently proposed design at Sellindge expect to
Receiving WwTW environmental permit for TN	25	mg/l TN	achieve TN value of 25 mg/l as per SW advice received. However, a use of MBR could potentially further lower this TN figure if required.
Receiving WwTW environmental permit for TP	0.3	mg/I TP	Used proposed EA TP permit level for Sellindge WwTW upgrade.
90% of the proposed consent TN limit	22.5	mg/I TN	Applied 90% correction as a precautionary basis.
90% of the proposed consent TP limit TN discharged after WwTW treatment	0.27	mg/l TP mg/TN/day	
TP discharged after WwTW treatment	855086.22	mg/TP/day	
Annual wastewater total nitrogen load	26008.87	kg/TN/yr	
Annual wastewater total phosphorous load	312.11	kg/TP/yr	
Stage 2	Figures	Units/ Data source	Further information
	A mixture of arable land (i.e. Cereals/Lowland Grazing	Ecology Survey report reference/remote imagery	
1	Livestock), Hay Cut, Mixed and		
	Other Grassland (see the		
	breakdown in Table 2 below and		
	'Land Type Overview' Tab) - this largely based on the habitat survey		
	info presented in the previous OP		
	Outline Planning Application in		
Current land use	2019.		
Total area of existing 'agricultural' and other land	613.4	hectares	See Table 2A/2B & Input Data Tab
Nilvate loss from current site land use	See Table 2A/2B	kgNhalyr	
Nitrale loss from current site land use	See Table 2A/2B	kgNħalyr	
Phosohate loss from current site land use	See Table 2A/2B	knP/ha/vr	
Phosphate loss from current site land use Total nitrate loss from current land use	See Table 2A/2B 11573.19	knP/halyr KnNvr	See Table 24/28
Phosphate loss from current site land use Total nitrate loss from current land use Total Phosphate loss from current land use	See Table 2A/2B 11573.19 196.26	knPhalyr kgNyr kgPlyr	See Table 2A/2B
Phosphale loss from current site land use Total initiate loss from current land use Total Phosphale loss from current land use (Stage 3	See Table 2A/2B 11573.19 196.26 Figures	knPihalyr kgWyr kgPyr units/ Data source	See Table 2A/2B Further information
Phosphate loss from current sile land use Total initrate loss from current land use Total Phosphate loss from current land use Sitage 3 New urban area	See Table 2A/2B 11573.19 196.26 Figures 289.5	knP/ha/yr kgNyr kgP/yr ectares/site layout	See Table 2A/2B
Phosphate loss from current site land use Total initial loss from current land use Total Phosphate loss from current land use Stage 3	See Table 2A/2B 11573.19 19626 Figures 289.5 143.3 0.83	knP/ha/yr knP/ha/yr kgP/yr units/ Data source hectares/site layout kgD/ha/yr kgD/ha/yr	See Table 2A/2B Further information
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and Types and Nutrient Loss Rates (Otterpool Ma

Table 2A - Existing Land Types and Nutrient Loss Rates (Otterpool Master	plan Framework)				
		Average Nutrient Loss Rate		Estimated Nutri	entioss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
Cereals	324.9	27.3	0.36	8869.77	116.96
Lowland Grazing Livestock	119.1	12.2	0.24	1453.02	28.58
Racetrack	13.5	13.25	0.535	178.88	7.22
Hay Cut	18.9	5	0.14	94.50	2.65
Other Grassland/Greenfield	101.1	5	0.14	505.50	14.15
Mixed area - Urban	11.5	14.3	0.83	164.45	9.55
Mixed area - Greenfield	4.5	5	0.14	22.50	0.63
Remaining Urban Area in Framework Masterplan, CSD9A & CSD9B	19.9	14.3	0.83	284.57	16.52
	613.4			11573.19	196.26

e 2B - Existing Land Types and Nutrient Loss Rates (CSD9A & CSD9B)

				Estimated Nutri	antioss
Land Type	Hectares	Nitrate - Nitrogen (kg N/ha/yr)	Phosphorous (kg P/ha/yr)	Nitrate - nitrogen (kg N/yr)	Phosphorous (kg P/yr)
CSD9B (Cereals)	0	27.3	0.36	0.00	0.00
CSD9B (Urban)	0	14.3	0.83	0.00	0.00
CSD9B (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
CSD9A (Urban)	0	14.3	0.83	0.00	0.00
CSD9A (Other Grassland/greenfield)	0	5	0.14	0.00	0.00
	0.0			0.00	0.00
* Note that Sellindge Sites are not applicapable for this calcula	ation sheet purpose (i.e. only OFMA is included).				

Stage 1 to Stage 3 Nutrient Loading Calcs Summary				
TN (kgN/yr)	TP (kgP/yr)			
26008.9	312.1			
11573.2	196.3			
5768.2	278.0			
	26008.9 11573.2			

	TN (kgN/yr)	TP (kgP/yr)	
Step 1 (Stage 1)	26008.9	312.1	
Step 2 (Stage 3 - Stage 2)	-5805.0	81.7	
Step 3 (Step 1 + Step 2)	20203.8	393.8	
Step 4 (= Step 3, i.e. N/P budget without buffer)	20203.8	393.8	
Step 5 (Step 4*20%)	4040.8	78.8	
Step 6 (Step 4 + Step 5)	24244.6	472.6	
	24244.6	472.6	

us Budget with 20% buffer

4. Nutrient Mitig Rquir Summary

Nutrient Budget Summary

	PCC (Sce	enario 1)	PCC (Sce	nario 2)
WwTW Option	TN (Kg/yr)	TP (Kg/yr)	TN (Kg/yr)	TP (Kg/yr)
Southern Water - Sellindge WwTW	27100	507	24245	473

Nutrient Mitigation - Wetland Area Requirement Summary

	PCC (Sce	enario 1)	PCC (Sce	mario 2)
WwTW Option	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)
Southern Water - Sellindge WwTW	29.1	42.2	26.1	39.4

Assumed Wetland TN removal rate	93 g/m2/yr	930 kg/ha/yr
Assumed Wetland TP removal rate	1.2 g/m2/yr	12 kg/ha/yr

PCC Scenario 1 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 350 l/p/d Hotel (Class C1) = 300 l/p/d PCC Scenario 2 Residential (Class C3) = 110 l/p/d Residential (Class C2) = 262.5 l/p/d Hotel (Class C1) = 225 l/p/d

7. Proposed Land Use

	Area (ha)
Total Urban in Framework Masterplan	350.5
Total Landscape open space in Framework Masterplan	275.2
Exisiting community in framework masterplan area	71
Retained farmland in framework masterplan area	49.4
Existing Road	10
Total OP Framework Area	756.10

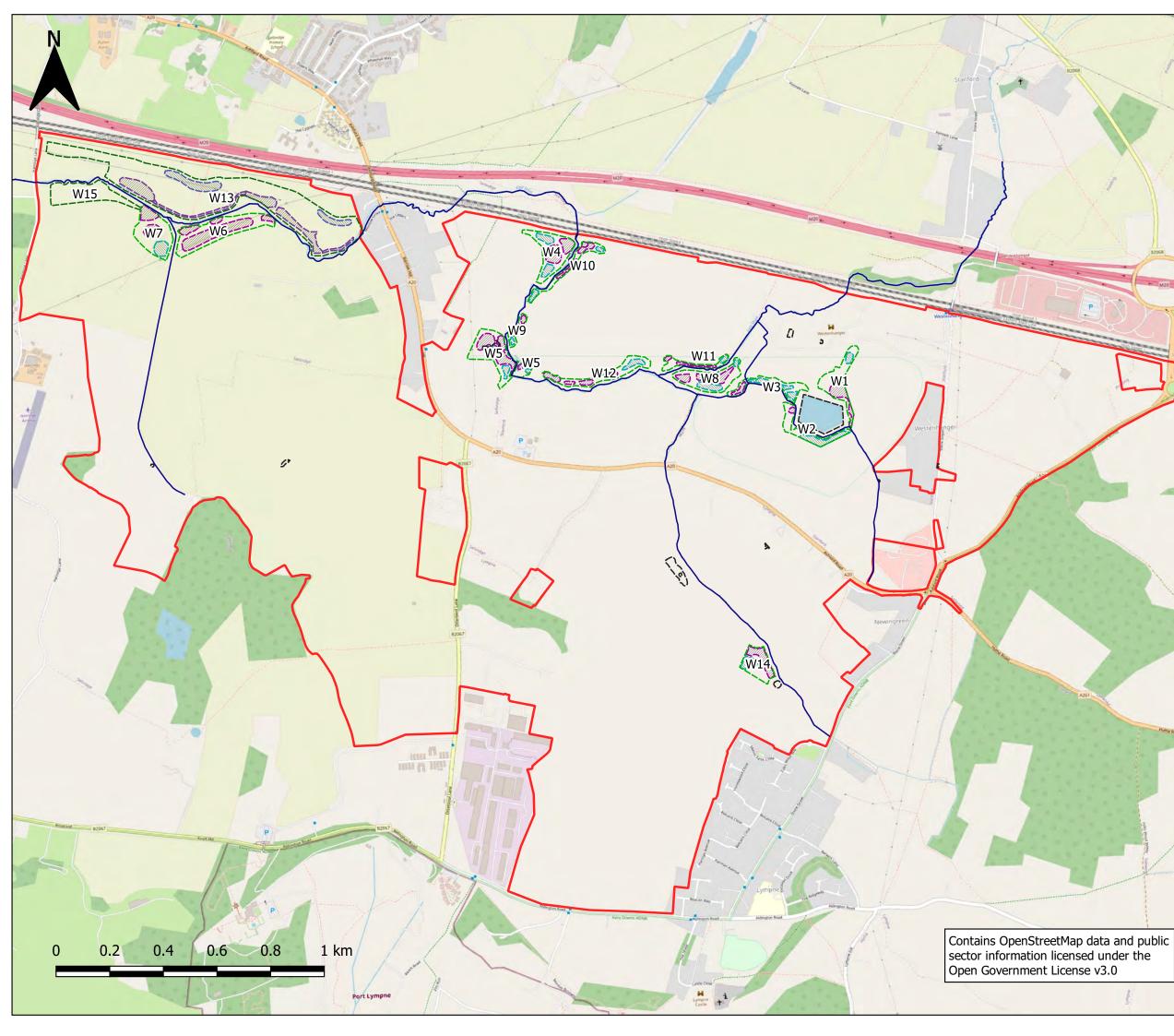
	New Urban Area (ha)	New Open Space (ha)	Total Site Area (ha)	Impermeabilty (%)	Houses (No)
CSD9A & 9B TOTAL	0	0.00	0		0

* Note that Sellindge Sites are not applicapable for this calculation sheet purpose (i.e. only OFMA is included).

PROPOSED LAND USE AREA SUMMARY FOR NUTRIENT LOADING CALCS - OTTER	RPOOL FRAMEWORK MASTE	ERPLAN
	На	На
Excluded Retained Existing Land		
Existing community in framework masterplan area	71.0	
Retained farmland in framework masterplan area	49.4	
Existing Roads	10.0	
Existing vegetation/buildings/ waterbodies/ ecological features within the current OPA boundary	16.8	147.2
Excluded Mitigation Land From SANG		
Wetlands	30	65
Woodland *	35	
Community Farm/Allotment Land in current OPA boundary	9.8	
Remaining Total SANG in Framework Masterplan*	244.6	
Total Urban Area in Framework Masterplan	289.5	
Total OP Framework Area Check	756.1	
*note leachate loads from woodland is calculated separately instead of SANG leach	ate rates.	

APPENDIX F

Nutrient Neutrality Mitigation Strategy



Legend

OPA Site Boundary Modelled Watercourses Existing Ponds/ Lakes Proposed stormwater wetland outline Deep open water zone Open water zone Proposed wastewater wetland outline Deep open water zone Open water zone



Note:

 The nutrient mitigation requirements and mitigation proposals for the OPA and OFMA Development are fully detailed in Arcadis Water Cycle Report 10029956-AUK-XX-XX-RP-CW-0011-P3. This shows that a minimum of 11.7 ha of wastewater welland area and 13.2 ha of stormwater wetland area would be required for the proposed total development in OFMA plus Sellindge Phase 2 Sites.

 Wastewater Wetland W15 is not required for the current OPA but it will be needed to accommodate the extra 1500 dwellings within the OFMA.

3. The proposed nutrient mitigation strategy also includes a minimum of 35 ha of additional woodland planting as shown in the proposed structural planting drawing No. 10029956-AUK-XX-XX-DR-LA-0002-P1. Of these woodland, approximately 8 ha, is likely to be wet woodland planting.

P3 03/03/2022 FINAL MG RG RG	Version	Date	Status	Author	Checker	Approver
	P3	03/03/2022	FINAL	MG	RG	RG

ARCADIS

80Fen 80 Fenchurch Street London EC3M 4BY



Otterpool Park - Proposed Nutrient Neutrality Mitigation Strategy 10029956-AUK-XX-XX-DR-CW-0041-P3

Jane	scale	original size	datum	grid
tym	1:12,500	A3	mAOD	OSGB 27700

APPENDIX G

Severn Trent Connect Appointment Clarification Letter



2nd December 2021

Dear Renuka

Otterpool Park Garden Town

This correspondence is to confirm that Otterpool Park LLP have appointed Severn Trent Connect to progress the onsite Otterpool WwTW feasibility studies, enhanced outline design and EA discharge permit application. The timeline we are working to is as follows,

- Water quality study to be completed by March 2022 with the final report due in April 2022
- Enhanced outline design due in March 2022
- EA permit application submission due by end of May 2022 (to be drafted during May after the results of the WQ study are available)
- EA permit granted in May 2023

The Ofwat application will then follow.

Yours sincerely



Gary Ridgewell Construction Director

The Jockey Club, Folkestone Racecourse, Stone Street, Westenhanger, Kent CT21 4HX

www.otterpoolpark.org



Registered address: Civic Centre, Castle Hill Avenue, Folkestone, Kent, CT20 2QY

APPENDIX H

NUTREM® Process Overview



NUTREM® Process Overview





Developed by Plantwork Systems Ltd, the NUTREM® process is an advanced activated sludge process which can achieve exceptional levels of nutrient removal from wastewater **without any requirement for chemical dosing**.

Contact: Robert White Email: robert.white@plantworksystems.com Tel: +44 (0) 800 310 2073

www.plantworksystems.com



Overview

NUTREM[®] is an activated sludge process which has been developed to include the integration of advanced process control and configuration with the same basic principles founded by Arden & Lockett over 100 years ago.

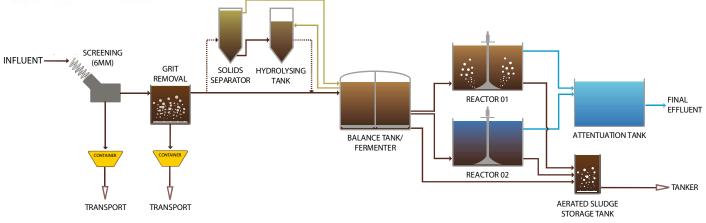
The process is the result of an evolution of our tried and tested Pure SBR technology, updated to meet the emerging needs of our environment.

The control philosophy and several key areas of the plant have been updated to create the perfect conditions for biological nutrient removal (BNR). Online instrumentation monitors key parameters to maintain these conditions within the system whilst influent parameters vary due to weather and other external factors. This enables tight total phosphorus consents to be met all year round, without the need for chemical dosing.

In addition to the removal of nutrients from the wastewater, the general water quality produced by the system is excellent and offers end users the option to consider water reuse (with some additional disinfection) for their effluent.







General Process Description

The following section provides a general process overview of a NUTREM[®] system and is not site specific.

01 Inlet Flows

Wastewater can be delivered to the plant via either gravity or pumped sewer mains. Flows pass through 6mm screening and grit removal prior to arriving at the Balance Tank/Fermenter.

02 Balance Tank/Fermnter(s)

No primary settlement is required for the NUTREM® process – all load is delivered to the Balance Tank/ Fermenter. The tank is covered and both the depth and settled sludge level are monitored. Tank contents are mixed periodically using a mixing pump located outside the tank. A sludge blanket monitor is used to detect the settled sludge level. If the monitor detects the top of the settled sludge layer then sludge is removed from the tank at preset intervals. Removal of sludge at this stage in the process serves two functions, firstly to maintain the settled sludge level in the tank to avoid excessive build up, and secondly to remove any rag and grit present at the bottom of the tank.

The Balance/Fermenter Tank serves two distinct purposes in the treatment cycle. Firstly, it is used to balance the incoming flows prior to being passed forward for processing in the Reactors. Its second function is to act as an anaerobic fermenter in which incoming rbCOD is fermented to VFAs, mainly acetic and propionic. This is crucial to enable the PAOs present in the Reactors to release and then super absorb Phosphorus.

03 Booster System

Where site conditions require it, a hydrolysing system is installed alongside the Balance Tank/Fermenter to provide an offline VFA store for the process. This system includes a solids separation device and a hydrolysing tank. A portion of the incoming raw sewage is pumped via the solids separation device and the sludge generated is transferred to the hydrolysing tank, whilst the supernatant is gravity fed to the Balance Tank/Fermenter. Liquid from the Balance Tank/Fermenter is pumped to the Hydrolysing Tank and mixed with the hydrolysing solids. A portion of the Hydrolysing Tank contents is then pumped back to the Balance Tank/Fermenter to boost fermentation.

04 Reactor(s)

The NUTREM® Reactors use simultaneous fill and decant, whereby the treated water is discharged using a piston effect created by the introduction of the fermented, raw, screened sewage. This influent is introduced at the bottom of the tank where it is gently mixed with the settled biomass using the hyperboloid mixer. The sludge blanket remains undisturbed, whilst the clean effluent in the top of the tank is discharged via the PWS Siphon Decanter.



During this anaerobic phase at the bottom of the Reactors, the PAOs store VFAs and release Phosphorus. On entering an aerobic treatment phase, they perform luxury uptake of Phosphorus meaning the PAOs absorb a greater amount of Phosphorus than they released in the first phase of treatment. It is during the aerobic phase at the end of the treatment cycle that Phosphorus rich SAS is removed from the Reactor and transferred to the Aerated Sludge Storage Tank.



Once the fill/decant stage is complete, and the influent has had appropriate contact time with the biomass, the aerobic and anoxic treatment stages are carried out. During these treatment phases, simultaneous nitrification and de-nitrification is achieved using specific DO set points at different stages. A dedicated phase is included within the treatment cycle to ensure de-nitrification can occur, and, in prolonged periods of wet and/or cold weather, the SRT is automatically adjusted to ensure nitrification still occurs. The duration and timing of these phases are varied dependent on specific site conditions and permit requirements relating to which nutrient is being targeted for removal i.e. TP, TN or both.

05 Sludge Thickening

The sludge generated by the process can be thickened using either the PWS Static Sludge Thickener, or alternative sludge thickening equipment dependent on the target thickness required. Thickened sludge is held in the aerated sludge storage tank, whilst supernatant is returned to the head of works.

06 Aerated Sludge Storage Tank

Thickened sludge is stored within this tank and periodically aerated using a coarse bubble aeration grid to prevent the sludge thickening too much at the bottom of the tank and to prevent the sludge becoming septic and causing odour issues.

07 Final Effluent Discharge

The final effluent is discharged via gravity (where site hydraulics allow) from the reactor. The effluent flows through a sample chamber prior to discharging to the receiving water body.

08 Attenuation Tank (Optional)

Should there be a restriction on the discharge flow rate then an attenuation tank can be included. The level is monitored in the tank during discharge to ensure no risk of flooding is encountered if any blockages occur in the discharge pipework.

09 Final Effluent Disinfection and Polishing

Where appropriate, the discharge main to the receiving waters can be fitted with chlorination, ozonation or UV disinfection modules.

NUTREM[®] produces extremely good quality effluent and further polishing of the FE is not usually required. In cases where TP permit limits below 0.3mg/l are required, additional mechanical filtration units will be installed.

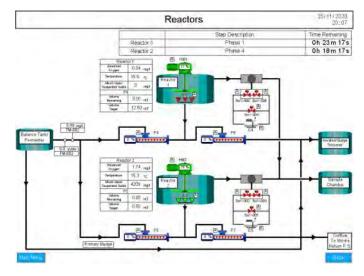
10 Control Kiosk and Panel

PWS install GRP kiosks to house the control panel and, on smaller facilities (<1,500PE), the pumps and other drives. The panel is supplied as standard with the facility to connect a generator in case of prologned power failure, and a permanent back-up generator can also be installed if required. The kiosk includes lighting, ventilation, heating and baffle boxes for reducing any noise being omitted.

11 Alarm System and Remote Monitoring

NUTREM[®] plants can be controlled via a remote link to the SCADA system, and includes the use of IP (Internet Protocol) cameras to provide operators with an overview of all the key areas of the plant. This system makes the diagnosis (and in some cases the resolution) of certain issues possible without the need for engineers to attend site.

The screenshot below shows an example of a typical NUTREM® mimic display (control screen). Phase timings, equipment state, instrumentation readings and alarms are displayed on the screen. Multiple mimics depicting the different areas of the plant are then accesible via the main menu, as well as alarm pages and trends.



APPENDIX I

Outline Foul Water Drainage Strategy Foul Water Design Statement and Criteria Outline Foul Water Strategy On-Site Pumping Station Calculations Output Summary Micro Drainage Schedules of On-site Foul Water Network



DESIGN BASIS STATEMENT (Inc. sources of info/data, assumptions made, standards, etc.)

Source of Data:

1. British Water CoP - Flows and Loads - 4th Edition - Table of Loadings for Sewage Treatment Systems to get the per capita flow rates for various types of developments.

https://arcadiso365.sharepoint.com/:b:/r/teams/project-

<u>10029956/Shared%20Documents/20%20Water/GIS/SHP/FW%20Drainage/Revised%20Design%20-%20Dec2020/British%20Water%20-</u> %20Flows%20and%20Loads%2043%20(March%202011).pdf?csf=1&web=1&e=95ISvU

2. Farrells Otterpool Development yearly phases_10-09-20.xlsx - for getting the occupancy rates for various developments

https://arcadiso365.sharepoint.com/teams/project-

10029956/Shared%20Documents/20%20Water/GIS/SHP/FW%20Drainage/Farrells%20Otterpool%20Development%20yearly%20phases 10-09-20.xlsx?web=1

3. Updated Development Accommodation Phasing - Issued 10/09/2020

https://arcadiso365.sharepoint.com/teams/project-

10029956/Shared%20Documents/Forms/AllItems.aspx?viewid=18bbd632%2D4141%2D4e19%2Dacfa%2D3d32d98fc3fe&id=%2Fteams%2Fproj ect%2D10029956%2FShared%20Documents%2F20%20Water%2FGIS%2FSHP%2FFW%20Drainage

4. Hydraulic Design of Foul Sewer and Pumping station - From Design and Construction Guidance - Issued 10/03/2020

https://arcadiso365.sharepoint.com/:b:/r/teams/project-

<u>10029956/Shared%20Documents/20%20Water/GIS/SHP/FW%20Drainage/Revised%20Design%20-%20Dec2020/SSG%20Appendix%20C-</u> Design%20and%20Construction%20Guidance%20v2.pdf?csf=1&web=1&e=NbX92o

5. Southern Water Developer Services – Modelling Criteria

https://arcadiso365.sharepoint.com/:b:/r/teams/project-10029956/Shared%20Documents/20%20Water/GIS/SHP/FW%20Drainage/Revised%20Design%20-%20Dec2020/DS-Modelling-Criteria.pdf?csf=1&web=1&e=ZS2Dzc

Assumptions:

Type of Development	N	IA		Occupancy Rate		Flow per person/act (unless otherwise s		Comments
	%	Unit	Rate	Value	Unit	Rate	Units	
A1 Retail	80%	of GIA	1 per	18	m ² NIA	50	l/p/d	
A2 business, A3 café restaurant, A4 pub,takeway	80%	of GIA	1 per	17	m ² NIA	50	l/p/d	Office / Factory without canteen
B8 Storage business park	95%	of GIA	1 per	81	m ² GIA	50	l/p/d	
B1 Commercial business park	80%	of GIA	1 per	12	m ² NIA	75	l/p/d	Water consumption assumes 50% with canteen (100 l/p/d) and 50% without canteen (50l/p/d) to give an average of 75l/p/d
B1 Commercial business in hubs	70%	of GIA	1 per	12	m ² NIA	50	l/p/d	
B2 Light Industrial business park	90%	of GIA	1 per	36	m ² GIA	60	l/p/d	
D1 Community Centre	80%	of GIA	1 per	100	m ² NIA	40	l/p/d	
D1 Health	80%	of GIA	1 per	30	m ² NIA	50	l/p/d	GEA = 1.1* GIA
D1 Nursery	80%	of GIA	Children + Employed	74	per school	90	l/p/d	Non-residential with canteen cooking on site
D1 Primary School	80%	of GIA	Children + Employed	460	per school	50	l/p/d	Non-residential without a canteen
D1 secondary schools exc GI	80%	of GIA	Children + Employed	1120	per school	90	l/p/d	Non-residential with canteen cooking on site
D2 Indoor sports hall	80%	of GIA	1 per	100	m ² NIA	40	l/p/d	GEA = 1.1* GIA
D2 Sports pavilion	80%	of GIA	1 per	100	m ² NIA	50	l/p/d	GEA = 1.1* GIA
C2, Extra Care Housing	80%	of GIA	1 per	100	m ² NIA	350	l/p/d	Residential old people / nursing - Not used
C1, Hotel	80%	occupancy	Occupant + 58 Employed	2	per room	250	l/p/d	
C1, Hotel	80%	occupancy	1 per	140	m ² NIA	250	l/p/d	
C3, Residential			Occupant	2.4	per dwelling	125	l/p/d	Applied for both C2 & C3 Housing

Hydraulic Design of Pumping Station - Design and Construction Guidance - Version 2.0 March 2020

D5.6 Hydraulic Design of Pumping Stations

1. The design flow rate of the pump units in foul pumping stations serving less than 500 dwellings should be at least the maximum of:

- a) half the incoming peak design flow rate (see Clause B3.1.1); and
- b) the flow rate required to achieve a minimum flow velocity in the rising main in accordance with D6.3.1.

For pumping stations serving more than 500 dwellings, the sewerage company should be consulted to determine the pump rate. 2. The pumping station design static head for the pump unit design flow rate should be based on the mid-point of the duty pump stop and start levels in the wet well. Calculations should be provided to confirm capacities of the pumping station based on the hydraulic design.

Emergency Storage Requirement

D5.5 Storage

1. To ensure that sewage flooding does not occur at, or upstream of, the pumping station during plant or power failure, additional storage should be provided. The base of this storage should be above the level of the high-level alarm and the top water level of this storage should be below the invert of the lowest lateral drain connection in the upstream network.

2. The plan area of the wet well below the level of the high-level alarm float switch level should not be increased to form any of this required storage provision. Such storage may be provided in:

- any upstream public sewers and public lateral drains and associated manholes and inspection chambers, up to the level of the invert of the upstream end of the lowest public lateral drain (storage should not be provided in private drainage and calculations should be provided); and
 b) specifically-designed adjacent storage structures that are designed to be self cleansing.
- specifically-designed adjacent storage structures that are designed to be sen cleansing.

3. For foul pumping stations serving less than 500 dwellings, as a minimum, the storage should equate to 160 litres per dwelling, and for commercial or industrial developments one hour of peak design flow rate. For pumping stations serving 500 dwellings or more, the sewerage company should be consulted to determine the storage requirements.

4. For surface water pumping stations, 125 m³ of storage should be provided per hectare of impermeable surface draining to the pumping station (i.e., 15 minutes of rainfall at 50 mm per hour).

B3 HYDRAULIC DESIGN

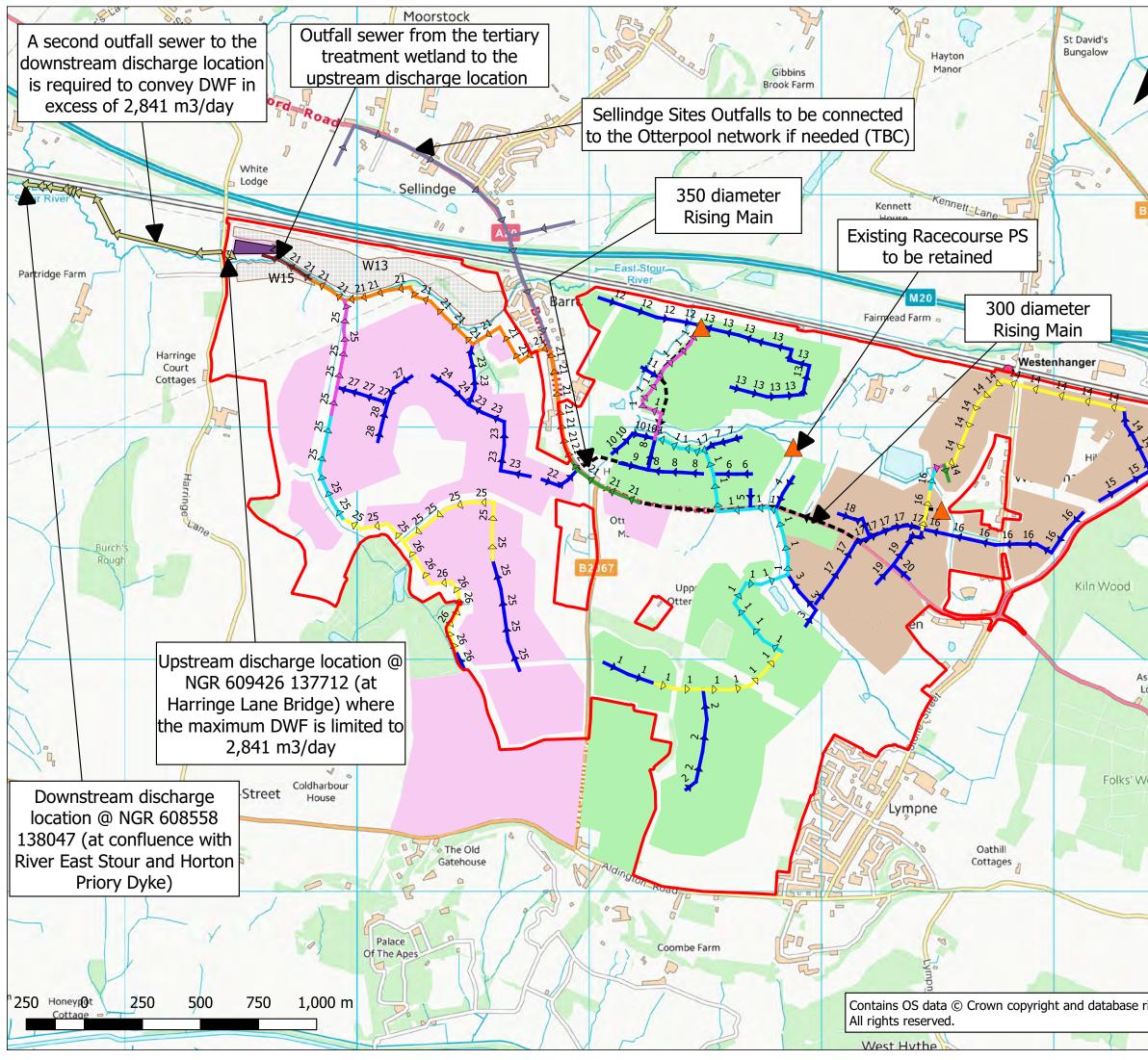
B3.1 Foul Sewers and Lateral Drains

1. The peak design flow rates for dwellings should, at the discretion of the designer, be either:

- a) calculated in accordance with BS EN 12056-2 System II (this method is recommended for this application in BS EN 16933-2); or
- b) 4000 litres per dwelling per day (0.05 litres per second per dwelling). Note: This is a design peak flow rate not a daily average water usage, and represents the peak flow rate from a number of appliances. Reducing daily water usage does not necessarily reduce the peak flow rate.

D6.3 Hydraulic Design

1. The diameter of the rising main should be such that the velocity of the discharge is in the range 0.75–1.8 m per second when the pump unit is operating.



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SPS	Design Flow (I/s)	Working Sump Capacity (m ³)	Sump Asm. Dia. (m)	Operating Depth (m)	Incoming Depth at SPS from Design (m)	Min Sump Depth (m)	Emergency	Cumulative Emergency Storage (m ³)		Comments
PS1	97	8.7	3.0	1.2	2.6	4.4	671	671	300	Assumptions:
PS2	105	9.5	3.0	1.3	5.6	7.5	726	726	350	 0.1m freeboard between i/c pipe invert and pump ON level 0.5m depth between sump floor and pump OFF level Velocity through rising main = 1.4m/s
Sellindge	8	0.7	4.0	0.1	1.2	1.9	-	-	150	4. Pump Starts/hour = 10





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			Pipe	e Sizes	STANDARD	Manhole S	izes :	STANDAI	RD			
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PN	Length (m)	Fall (m)	Slope (1:X)			Base low (l/s)	k (mm)	HYD SECT		ction 1		Auto Design
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1.001	124.454 PN US	0.929 s/IL Σ (m) .910	133.9 Area (ha)	0.000 <u>Ν</u> ε Σ Bas Flow (1	140 etwork F e EHse	0.0 Results T Add Flow (1/s) 5 0.9	1.500 <u>able</u> P.Dep (mm) 97	• P.Vel (m/s) 0.83	150 Pi vel (m/s)	pe/Cond Cap	Flow (1/s) 10.0	.

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PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	ase (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.002	94.357	0.607	155.4	0.000	81	0.0	1.500	0	225	Pipe/Conduit	æ
1.003	114.055	0.491	232.3	0.000	254	0.0	1.500	0	225	Pipe/Conduit	ď
2.000	53.676	0.660	81.3	0.000	102	0.0	1.500	0	150	Pipe/Conduit	ď
2.001	134.096	1.630	82.3	0.000	88	0.0	1.500	0	150	Pipe/Conduit	ð
2.002	138.806	2.280	60.9	0.000	0	0.0	1.500	0	150	Pipe/Conduit	<u>.</u>
2.003	130.667	2.546	51.3	0.000	161	0.0	1.500	0	150	Pipe/Conduit	ď
1.004	119.687	0.849	141.0	0.000	0	0.0	1.500	0	225	Pipe/Conduit	ď
1.005	87.665	3.090	28.4	0.000	0	0.0	1.500	0	225	Pipe/Conduit	ď

	PN	US/IL (m)	Σ Area (ha)	Σ E Flow		Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)		Cap (1/s)	Flow (l/s)
1	.002	98.132	0.000		0.0	656	1.4	100	0.87	0.92	36.6	15.0
1	.003	97.525	0.000		0.0	910	1.9	138	0.81	0.75	29.9	20.9
2	.000	104.150	0.000		0.0	102	0.2	38	0.68	0.97	17.2	2.3
2	.001	103.490	0.000		0.0	190	0.4	52	0.81	0.97	17.1	4.4
2	.002	101.860	0.000		0.0	190	0.4	48	0.90	1.12	19.9	4.4
2	.003	99.580	0.000		0.0	351	0.7	63	1.13	1.22	21.6	8.0
1	.004	97.034	0.000		0.0	1261	2.6	146	1.06	0.97	38.4	28.9
1	.005	96.185	0.000		0.0	1261	2.6	90	1.95	2.16	85.9	28.9
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PN	Length	Fall	Slope	Area	Houses	Base	e	k	HYD	DIA	Section Type	Auto	
	(m)	(m)	(1:X)	(ha)		Flow ()	l/s)	(mm)	SECT	(mm)		Design	
1.006	87.953	6.020	14.6	0.000	150		0.0	1.500	0	225	Pipe/Conduit	ď	
1.007	110.886	8.045	13.8	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ð	
1.008	89.900	0.269	334.7	0.000	70		0.0	1.500	0	300	Pipe/Conduit	Ū,	
	131.095				0			1.500			Pipe/Conduit	ீ	
	72.895				73			1.500			Pipe/Conduit	ெ	
1.011					98			1.500			Pipe/Conduit	ெ	
1.012				0.000	70			1.500	0		Pipe/Conduit	ெ	
1.013	122.542	1.490	82.2	0.000	84		0.0	1.500	0	300	Pipe/Conduit	ď	
3.000	79.530	0.594	133.9	0.000	67		0.0	1.500	0	150	Pipe/Conduit	e	
								able					

(m)	(ha)	Flow (l/s)		(1/s)	(mm)	(m/s)	(m/s)	(1/s)	(1/s)
93.095	0.000	0.0	1411	2.9	80	2.56	3.01	119.7	32.3
87.075	0.000	0.0	1411	2.9	79	2.61	3.10	123.3	32.3
79.030	0.000	0.0	1481	3.1	174	0.80	0.76	53.4	33.9
78.761	0.000	0.0	1481	3.1	174	0.80	0.76	53.4	33.9
78.370	0.000	0.0	1554	3.2	179	0.81	0.76	53.4	35.6
78.152	0.000	0.0	1652	3.4	118	1.47	1.64	115.8	37.9
76.760	0.000	0.0	1722	3.6	91	2.17	2.78	196.3	39.5
74.170	0.000	0.0	1806	3.8	129	1.43	1.53	108.1	41.4
73.600	0.000	0.0	67	0.1	34	0.50	0.76	13.4	1.5
13.000	0.000		-			0.50	0.76	13.4	1.0
	93.095 87.075 79.030 78.761 78.370 78.152 76.760 74.170	93.095 0.000 87.075 0.000 79.030 0.000 78.761 0.000	93.095 0.000 0.0 87.075 0.000 0.0 79.030 0.000 0.0 78.761 0.000 0.0 78.370 0.000 0.0 78.152 0.000 0.0 76.760 0.000 0.0 74.170 0.000 0.0 73.600 0.000 0.0	93.095 0.000 0.0 1411 87.075 0.000 0.0 1411 79.030 0.000 0.0 1481 78.761 0.000 0.0 1481 78.370 0.000 0.0 1554 78.152 0.000 0.0 1652 76.760 0.000 0.0 1722 74.170 0.000 0.0 67	87.075 0.000 0.0 1411 2.9 79.030 0.000 0.0 1481 3.1 78.761 0.000 0.0 1481 3.1 78.370 0.000 0.0 1554 3.2 78.152 0.000 0.0 1652 3.4 76.760 0.000 0.0 1722 3.6 74.170 0.000 0.0 67 0.1	93.095 0.000 0.0 1411 2.9 80 87.075 0.000 0.0 1411 2.9 79 79.030 0.000 0.0 1481 3.1 174 78.761 0.000 0.0 1481 3.1 174 78.370 0.000 0.0 1554 3.2 179 78.152 0.000 0.0 1652 3.4 118 76.760 0.000 0.0 1722 3.6 91 74.170 0.000 0.0 1806 3.8 129	93.095 0.000 0.0 1411 2.9 80 2.56 87.075 0.000 0.0 1411 2.9 79 2.61 79.030 0.000 0.0 1481 3.1 174 0.80 78.761 0.000 0.0 1481 3.1 174 0.80 78.370 0.000 0.0 1554 3.2 179 0.81 78.152 0.000 0.0 1652 3.4 118 1.47 76.760 0.000 0.0 1722 3.6 91 2.17 74.170 0.000 0.0 1806 3.8 129 1.43	93.095 0.000 0.0 1411 2.9 80 2.56 3.01 87.075 0.000 0.0 1411 2.9 79 2.61 3.10 79.030 0.000 0.0 1481 3.1 174 0.80 0.76 78.761 0.000 0.0 1481 3.1 174 0.80 0.76 78.370 0.000 0.0 1554 3.2 179 0.81 0.76 78.152 0.000 0.0 1652 3.4 118 1.47 1.64 76.760 0.000 0.0 1806 3.8 129 1.43 1.53 73.600 0.000 0.0 67 0.1 34 0.50 0.76	93.095 0.000 0.0 1411 2.9 80 2.56 3.01 119.7 87.075 0.000 0.0 1411 2.9 79 2.61 3.10 123.3 79.030 0.000 0.0 1481 3.1 174 0.80 0.76 53.4 78.761 0.000 0.0 1481 3.1 174 0.80 0.76 53.4 78.370 0.000 0.0 1554 3.2 179 0.81 0.76 53.4 78.152 0.000 0.0 1652 3.4 118 1.47 1.64 115.8 76.760 0.000 0.0 1722 3.6 91 2.17 2.78 196.3 74.170 0.000 0.0 1806 3.8 129 1.43 1.53 108.1

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		Network	Design	Table	for	Foul	-	Main
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PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	ase (1/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.001 3.002	106.302 90.026				0 0		1.500 1.500	0		Pipe/Conduit Pipe/Conduit	୍କ ଟ
	74.942 102.609 115.311	0.307	334.2		0 27 0	0.0	1.500 1.500 1.500	0 0 0	300	Pipe/Conduit Pipe/Conduit Pipe/Conduit	6 6 6
4.000 4.001	77.718 70.927				88 0		1.500 1.500	0 0		Pipe/Conduit Pipe/Conduit	6 6

<u>Network Results Table</u>

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)		-	Flow (l/s)	
3.001	73.006	0.000	0.0	67	0.1	34	0.50	0.76	13.4	1.5	
3.002	72.212	0.000	0.0	67	0.1	34	0.50	0.76	13.4	1.5	
1.014	71.540	0.000	0.0	1873	3.9	204	0.84	0.76	53.5	42.9	
1.015	71.316	0.000	0.0	1900	4.0	206	0.84	0.76	53.5	43.5	
1.016	71.009	0.000	0.0	1900	4.0	136	1.39	1.45	102.4	43.5	
4.000	68.720	0.000	0.0	88	0.2	40	0.54	0.76	13.4	2.0	
4.001	68.140	0.000	0.0	88	0.2	40	0.54	0.76	13.4	2.0	

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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	1

Network	Design	Table	for	Foul	-	Main
	-					-

PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
1.017	41.752	0.125	334.2	0.000	61		0.0	1.500	0	300	Pipe/Conduit	e
1.018	70.896	0.212	334.2	0.000	0		0.0	1.500	0	300	Pipe/Conduit	ď
5.000	71.411	0.820	87.1	0.000	9		0.0	1.500	0	150	Pipe/Conduit	ď
1.019	145.417	0.435	334.2	0.000	0		0.0	1.500	0	300	Pipe/Conduit	ď
1.020	69.369	0.208	334.2	0.000	0		0.0	1.500	0	300	Pipe/Conduit	ē
1.021	84.929	1.300	65.3	0.000	0		0.0	1.500	0	300	Pipe/Conduit	ď
6.000	64.047	1.260	50.8	0.000	41		0.0	1.500	0	150	Pipe/Conduit	ď

PN	US/IL (m)		Σ Base Flow (l/s)		Add Flow (l/s)	-			-	
1.017	67.610	0.000	0.0	2049	4.3	219	0.85	0.76	53.5	47.0
1.018	67.485	0.000	0.0	2049	4.3	219	0.85	0.76	53.5	47.0
5.000	70.640	0.000	0.0	9	0.0	12	0.31	0.94	16.6	0.2
1.019	67.273	0.000	0.0	2058	4.3	219	0.85	0.76	53.5	47.2
1.020	66.838	0.000	0.0	2058	4.3	219	0.85	0.76	53.5	47.2
1.021	66.630	0.000	0.0	2058	4.3	130	1.61	1.72	121.4	47.2
6.000	70.980	0.000	0.0	41	0.1	21	0.60	1.23	21.7	0.9
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PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	ase (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
6.001	98.197	4.390	22.4	0.000	0	0.0	1.500	0	150	Pipe/Conduit	ď
1.022	109.460	0.370	295.8	0.000	90	0.0	1.500	0	300	Pipe/Conduit	ď
7.000 7.001 7.002	57.723 59.162 44.046	1.130	52.4	0.000 0.000 0.000	0 0 0	0.0	1.500 1.500 1.500	0 0 0	150	Pipe/Conduit Pipe/Conduit Pipe/Conduit	6 6 6
1.023 1.024	28.390 37.720				109 0		1.500 1.500	0 0		Pipe/Conduit Pipe/Conduit	6 6

PN	US/IL (m)		Σ Base Flow (l/s)	Σ Hse	Add Flow (1/s)	P.Dep (mm)			Cap (1/s)	Flow (l/s)	
6.001	69.720	0.000	0.0	41	0.1	18	0.80	1.86	32.8	0.9	
1.022	65.330	0.000	0.0	2189	4.6	219	0.91	0.80	56.8	50.2	
7.001	69.170 68.250 67.120	0.000 0.000 0.000	0.0 0.0 0.0	0 0 0	0.0 0.0 0.0	0 0 0	0.00 0.00 0.00	1.11 1.21 1.95	19.6 21.4 34.4	0.0 0.0 0.0	
	64.960 64.864	0.000	0.0		4.8 4.8	229 229	0.91 0.91	0.80 0.80	56.8 56.8	52.7 52.7	
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	PN	Length	Fall	Slope	Area	Houses	Ba	ise	k	HYD	DIA	Section Type	Auto
		(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(mm)	SECT	(mm)		Design
1.	.025	47.528	0.161	295.8	0.000	59		0.0	1.500	0	300	Pipe/Conduit	ď
1.	.026	75.335	0.255	295.8	0.000	0		0.0	1.500	0	300	Pipe/Conduit	Ū,
1.	.027	40.088	0.136	295.8	0.000	84		0.0	1.500	0	300	Pipe/Conduit	Ū.
0	.000	87.763	0 655	133 0	0 000	0		0 0	1.500	0	150	Pipe/Conduit	•
						-						-	۹, e
	.001	84.538				109			1.500	0		Pipe/Conduit	6
8.	.002	61.315	0.458	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď
9.	.000	124.443	0.929	133.9	0.000	89		0.0	1.500	0	150	Pipe/Conduit	ď

<u>Network Results Table</u>

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (1/s)	P.Dep (mm)			Cap (1/s)	Flow (l/s)	
1.025	64.737	0.000	0.0	2357	4.9	234	0.91	0.80	56.8	54.0	
1.026	64.576	0.000	0.0	2357	4.9	234	0.91	0.80	56.8	54.0	
1.027	64.321	0.000	0.0	2441	5.1	242	0.91	0.80	56.8	55.9	
8.000	67.020	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0	
8.001	66.365	0.000	0.0	109	0.2	44	0.58	0.76	13.4	2.5	
8.002	65.733	0.000	0.0	109	0.2	44	0.58	0.76	13.4	2.5	
9.000	68.260	0.000	0.0	89	0.2	40	0.54	0.76	13.4	2.0	
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PN	Length	Fall	Slope	Area	Houses	Ba	Base				HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design		
8.003	137.286	1.025	133.9	0.000	102		0.0	1.500	0	150	Pipe/Conduit	ď		
10.000	66.490	1.520	43.7	0.000	0		0.0	1.500	0	150	Pipe/Conduit	đ		
10.001	56.063	1.655	33.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	Ť		
10.002	49.862	0.367	135.8	0.000	94		0.0	1.500	0	150	Pipe/Conduit	Ū,		
10.003	48.084	0.354	135.8	0.000	101		0.0	1.500	0	150	Pipe/Conduit	ď		
1.028	112.383	0.248	453.1	0.000	0		0.0	1.500	0	375	Pipe/Conduit	6		
1.029	85.263	0.188	453.1	0.000	230		0.0	1.500	0	375	Pipe/Conduit			
1.030	26.763	0.059	453.1	0.000	0		0.0	1.500	0	375	Pipe/Conduit	ď		

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)		Add Flow (1/s)	P.Dep (mm)			Cap (1/s)	
8.003	65.275	0.000	0.0	300	0.6	76	0.76	0.76	13.4	6.9
10.000	66.560	0.000	0.0	0	0.0	0	0.00	1.33	23.4	0.0
10.001	65.040	0.000	0.0	0	0.0	0	0.00	1.51	26.7	0.0
10.002	63.385	0.000	0.0	94	0.2	41	0.55	0.75	13.3	2.2
10.003	63.018	0.000	0.0	195	0.4	60	0.68	0.75	13.3	4.5
1.028	62.664	0.000	0.0	2936	6.1	257	0.83	0.75	82.9	67.3
1.029	62.416	0.000	0.0	3166	6.6	272	0.84	0.75	82.9	72.6
1.030	62.228	0.000	0.0	3166	6.6	272	0.84	0.75	82.9	72.6
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XP Solutions	Network 2019.1			

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)			ise (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
	53.918 65.827				0 0			1.500 1.500	0		Pipe/Conduit Pipe/Conduit	6 6
	56.784 29.123				145 0			1.500 1.500	0		Pipe/Conduit Pipe/Conduit	5
1.034 1.035	45.513 96.946 55.512 92.646	0.214 0.123	453.1 453.1	0.000	0 0 215 0		0.0	1.500 1.500 1.500 1.500	0 0 0	375 375	Pipe/Conduit Pipe/Conduit Pipe/Conduit Pipe/Conduit	6 6 6

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)		Add Flow (l/s)	P.Dep (mm)			Cap (1/s)	Flow (l/s)
1.031	62.168	0.000	0.0	3166	6.6	272	0.84	0.75	82.9	72.6
1.032	62.049	0.000	0.0	3166	6.6	272	0.84	0.75	82.9	72.6
11.000	63.550	0.000	0.0	145	0.3	51	0.63	0.76	13.4	3.3
11.001	63.126	0.000	0.0	145	0.3	51	0.63	0.76	13.4	3.3
1.033	61.904	0.000	0.0	3311	6.9	283	0.85	0.75	82.9	75.9
1.034	61.804	0.000	0.0	3311	6.9	283	0.85	0.75	82.9	75.9
1.035	61.590	0.000	0.0	3526	7.3	300	0.85	0.75	82.9	80.8
1.036	61.467	0.000	0.0	3526	7.3	300	0.85	0.75	82.9	80.8
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XP Solutions					Networ	ck 2019.1						
			Netv	work De	esign	Table for	Foul	- Mai	in			
PN	Leng	th Fall	Slope	Area	Houses	Base	k	HYD	DIA	Section 1	Гуре	Auto
	(m)	(m)	(1:X)	(ha)		Flow (l/s)	(mm)	SECT	(mm)		1	Design
12.00	0 142.1	163 1.062	2 133.9	0.000	76	0.0	1.500	0	150	Pipe/Cond	duit	æ
12.00	1 118.5	587 0.886	5 133.9	0.000	0	0.0	1.500			Pipe/Cond		ษั
12.00	2 99.6	551 0.744	133.9	0.000	215	0.0	1.500	0	150	Pipe/Cond	duit	Ū.
12.00	3 91.0	0.680) 133.9	0.000	0	0.0	1.500	0	150	Pipe/Cond	duit	ď
13.00	0 76.0	0.568	3 133.9	0.000	0	0.0	1.500	0	150	Pipe/Cond	duit	ď
13.00	1 86.9	966 0.649) 133.9	0.000	0	0.0	1.500	0	150	Pipe/Cond	duit	ř
13.00	2 62.5	575 0.467	133.9	0.000	0	0.0	1.500	0	150	Pipe/Cond	duit	ď
13.00	3 88.4	113 0.660) 133.9	0.000	0	0.0	1.500	0	150	Pipe/Cond	duit	ď
				Ne	twork	Results	<u> Table</u>					
	PN	US/IL X	7 7 7 7 7 7	Σ Bas	~ .	ise Add Flo	H D Do		1 170	1 Can	Flow	
	PN	(m)		гых (1		(1/s)				s) (1/s)		
												-
	12.000	62.859	0.000		0.0	76 0.	2 3'	7 0.5	2 0.'	76 13.4	1.	7
	12.001	61.797	0.000		0.0	76 0.	2 3'	7 0.5	2 0.	76 13.4	1.	7
	12.002	60.912	0.000		0.0 2	.91 0.	6 7	5 0.7	6 0 . ″	76 13.4	6.	7
	12.003	60.167	0.000		0.0 2	.91 0.	6 7	5 0.7	6 0.	76 13.4	6.	7
	13.000	68.440	0.000		0.0	0 0.	0	0.0	0 0.'	76 13.4	0.0	0
		67.872			0.0	0 0.				76 13.4		
		67.222			0.0	0 0.				76 13.4		
		66.755			0.0	0 0.				76 13.4		0
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PN	Length	Fall	Slope	Area	Houses	Base		k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
13.004	45.122	0.337	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	.
13.005	81.662	0.610	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	
13.006	91.733	0.685	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď
13.007	46.713	0.349	133.9	0.000	290		0.0	1.500	0	150	Pipe/Conduit	
13.008	127.588	0.953	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	
13.009	43.900	0.328	133.9	0.000	192		0.0	1.500	0	150	Pipe/Conduit	
13.010	64.004	0.478	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	
13.011	114.546	0.855	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	
13.012	57.907	0.432	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)		Cap (1/s)	Flow (l/s)	
13.004	66.095	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0	
13.005	65.758	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0	
13.006	65.148	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0	
13.007	64.463	0.000	0.0	290	0.6	75	0.76	0.76	13.4	6.6	
13.008	64.114	0.000	0.0	290	0.6	75	0.76	0.76	13.4	6.6	
13.009	63.161	0.000	0.0	482	1.0	104	0.85	0.76	13.4	11.0	
13.010	62.833	0.000	0.0	482	1.0	104	0.85	0.76	13.4	11.0	
13.011	62.355	0.000	0.0	482	1.0	104	0.85	0.76	13.4	11.0	
13.012	61.500	0.000	0.0	482	1.0	104	0.85	0.76	13.4	11.0	

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PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s	k) (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.037	10.364	0.021	500.0	0.000	240	0.	0 1.500	0	450	Pipe/Conduit	ď
14.000	132.014	0.986	133.9	0.000	117	0.	0 1.500	0	150	Pipe/Conduit	ď
	130.976 114.840			0.000	158 0		0 1.500 0 1.500	0 0		Pipe/Conduit Pipe/Conduit	ъ С
14.001 14.002 14.003			134.8		0 0 133	0.	0 1.500 0 1.500 0 1.500	0 0 0	150	Pipe/Conduit Pipe/Conduit Pipe/Conduit	66

PN	US/IL (m)		Σ Base Flow (l/s)		Add Flow (l/s)	-	P.Vel (m/s)		-	
1.037	59.487	0.000	0.0	4539	9.5	309	0.89	0.80	127.9	104.0
14.000	79.350	0.000	0.0	117	0.2	46	0.59	0.76	13.4	2.7
	<mark>83.540</mark> 81.040		0.0	158 158	0.3 0.3		0.90 0.94			3.6 3.6
14.001	78.364	0.000	0.0	275	0.6	73	0.74	0.75	13.3	6.3
	77.673 77.062	0.000	0.0		0.6 0.9		0.74 1.00		13.3 17.3	6.3 9.4
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XP Solutions	Network 2019.1	1

PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
14.004	66.768	0.498	134.1	0.000	132		0.0	1.500	0	150	Pipe/Conduit	æ
14.005	112.558				155			1.500	0		Pipe/Conduit	ď
14.006	118.570	0.510	232.6	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ď
14.007	112.795	0.485	232.6	0.000	0		0.0	1.500	0	225	Pipe/Conduit	
14.008	117.511	0.505	232.6	0.000	155		0.0	1.500	0	225	Pipe/Conduit	ď
14.009	77.495	0.333	232.6	0.000	354		0.0	1.500	0	225	Pipe/Conduit	Ū.
14.010	70.773	0.304	232.6	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ď
14.011	72.974	0.314	232.6	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ď
14.012	71.777	0.315	228.0	0.000	106		0.0	1.500	0	225	Pipe/Conduit	ď
14.013	85.452	1.798	47.5	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ď

PN	US/IL	Σ Area	Σ Base	Σ Hse	Add Flow	P.Dep	P.Vel	Vel	Cap	Flow
	(m)	(ha)	Flow (l/s)		(l/s)	(mm)	(m/s)	(m/s)	(l/s)	(1/s)
14.004	76.300	0.000	0.0	540	1.1	114	0.86	0.76	13.4	12.4
14.005	75.802	0.000	0.0	695	1.4	117	0.76	0.75	29.9	15.9
14.006	75.318	0.000	0.0	695	1.4	117	0.76	0.75	29.9	15.9
14.007	74.809	0.000	0.0	695	1.4	117	0.76	0.75	29.9	15.9
14.008	74.324	0.000	0.0	850	1.8	132	0.80	0.75	29.9	19.5
14.009	73.819	0.000	0.0	1204	2.5	171	0.85	0.75	29.9	27.6
14.010	73.486	0.000	0.0	1204	2.5	171	0.85	0.75	29.9	27.6
14.011	73.181	0.000	0.0	1204	2.5	171	0.85	0.75	29.9	27.6
14.012	72.868	0.000	0.0	1310	2.7	184	0.86	0.76	30.2	30.0
14.013	72.553	0.000	0.0	1310	2.7	106	1.63	1.67	66.3	30.0
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	1

PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(mm)	SECT	(mm)		Design
14.014	118.034	1.090	108.3	0.000	128		0.0	1.500	0	225	Pipe/Conduit	6
14.015	87.637	0.665	131.8	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ř
14.016	89.387	0.267	334.7	0.000	175		0.0	1.500	0	300	Pipe/Conduit	
14.017	81.848	0.181	453.1	0.000	1163		0.0	1.500	0	375	Pipe/Conduit	Ť
16.000	100.227	0.749	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	6
16.001	110.563	0.826	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	Ť
16.002	96.176	1.286	74.8	0.000	0		0.0	1.500	0	150	Pipe/Conduit	Ŭ,
16.003	84.821	4.430	19.1	0.000	0		0.0	1.500	0	150	Pipe/Conduit	Ť
16.004	91.020	1.490	61.1	0.000	370		0.0	1.500	0	150	Pipe/Conduit	ĕ

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)		Vel (m/s)	Cap (1/s)	Flow (1/s)
14.014	70.755	0.000	0.0	1438	3.0	146	1.21	1.10	43.9	33.0
14.015			0.0		3.0	157	1.12	1.00	39.7	33.0
14.016	69.000	0.000	0.0	1613	3.4	184	0.81	0.76	53.4	37.0
14.017	68.733	0.000	0.0	2776	5.8	247	0.83	0.75	82.9	63.6
16.000	87.300	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0
16.001	86.551	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0
16.002	85.726	0.000	0.0	0	0.0	0	0.00	1.01	17.9	0.0
16.003	84.440	0.000	0.0	0	0.0	0	0.00	2.01	35.5	0.0
16.004	80.010	0.000	0.0	370	0.8	69	1.08	1.12	19.8	8.5
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File 10029956-AUK-XX-XX-M3-0	CW-0038	-Otte	rpool	P	Checke	ed by							Drainage
XP Solutions					Netwoi	ck 2019	9.1						
			<u>Netw</u>	ork D	esign	Table i	for	Foul	- Ma	in			
PN	Length		-		Houses	Base		k	HYD		Section Type		
	(m)	(m)	(1:X)	(ha)		Flow (1	./s)	(mm)	SECT	(mm)		Design	
16.005	110.928	3.610	30.7	0.000	0		0.0	1.500	0	150	Pipe/Conduit	e	
16.006	116.560	0.867	134.5	0.000	0		0.0	1.500	0	150	Pipe/Conduit		
16.007	95.027	0.707	134.5	0.000	166		0.0	1.500	0	150	Pipe/Conduit	ď	
17.000	104.733	0.782	133.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	a	
	109.416				187			1.500			Pipe/Conduit		
17.002	93.850	0.701	133.9	0.000	0			1.500			Pipe/Conduit		
17.003	58.949	0.440	133.9	0.000	281		0.0	1.500	0	150	Pipe/Conduit		
18.000	86.874	0.890	97.6	0.000	0		0.0	1.500	0	150	Pipe/Conduit	e	

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)			Cap (1/s)	Flow (l/s)
16.005	78.520	0.000	0.0	370	0.8	57	1.39	1.58	28.0	8.5
16.006	74.910	0.000	0.0	370	0.8	87	0.80	0.75	13.3	8.5
16.007	74.043	0.000	0.0	536	1.1	113	0.86	0.75	13.3	12.3
17.000	75.890	0.000	0.0	0	0.0	0	0.00	0.76	13.4	0.0
17.001	75.108	0.000	0.0	187	0.4	59	0.67	0.76	13.4	4.3
17.002	74.291	0.000	0.0	187	0.4	59	0.67	0.76	13.4	4.3
17.003	73.590	0.000	0.0	468	1.0	102	0.84	0.76	13.4	10.7
18.000	74.620	0.000	0.0	0	0.0	0	0.00	0.89	15.7	0.0
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File 10029956-AUK-XX-XX-M3-C	CW-0038	-Otte	rpool	P	Check	ed b	ру						Diamage
XP Solutions					Netwo	rk 2	2019.1						
			<u>Netv</u>	work I	<u>Design</u>	Tab	le for	Foul	– Ma	<u>ain</u>			
PN	Length	Fall	Slope	Area	Houses	в	ase	k	HYD	DIA	Section Type	Auto	
	(m)	(m)	(1:X)	(ha)		Flow	/(1/s)	(mm)	SECT	(mm)		Design	
18.001	21.369	0.210	101.8	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď	
18.002	87.933	0.655	134.2	0.000	0		0.0	1.500	0	150	Pipe/Conduit		

17.005	57.073 57.687 56.422 65.583	0.430	134.2 134.2	0.000	0 0 0	0.0	1.500 1.500 1.500 1.500	0 0	150 150	Pipe/Conduit Pipe/Conduit Pipe/Conduit Pipe/Conduit	9 9 9 9 9
19.000	95.427	2.560	37.3	0.000	310	0.0	1.500	0	150	Pipe/Conduit	ď

<u>Network Results Table</u>

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (1/s)	P.Dep (mm)	P.Vel (m/s)		Cap (1/s)	Flow (1/s)	
18.001	73.730	0.000	0.0	0	0.0	0	0.00	0.87	15.3	0.0	
18.002	73.520	0.000	0.0	0	0.0	0	0.00	0.76	13.3	0.0	
17.004	72.865	0.000	0.0	468	1.0	102	0.84	0.76	13.3	10.7	
17.005	72.440	0.000	0.0	468	1.0	102	0.84	0.76	13.3	10.7	
17.006	72.010	0.000	0.0	468	1.0	102	0.84	0.76	13.3	10.7	
17.007	71.589	0.000	0.0	468	1.0	102	0.84	0.76	13.3	10.7	
19.000	78.320	0.000	0.0	310	0.6	54	1.23	1.44	25.4	7.1	
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XP Solutions	Network 2019.1	

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	lse (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
20.000	48.653	1.920	25.3	0.000	44	0.0	1.500	0	150	Pipe/Conduit	•
19.001	68.996	1.460	47.3	0.000	62	0.0	1.500	0	150	Pipe/Conduit	6
19.002	53.176	0.395	134.5	0.000	0	0.0	1.500	0	150	Pipe/Conduit	ď
19.003	63.108	0.469	134.5	0.000	0	0.0	1.500	0	150	Pipe/Conduit	ď
19.004	37.816	0.281	134.5	0.000	0	0.0	1.500	0	150	Pipe/Conduit	ð
16.008	68.698	0.356	193.2	0.000	0	0.0	1.500	0	225	Pipe/Conduit	6
16.009	27.482	0.142	193.2	0.000	0	0.0	1.500	0	225	Pipe/Conduit	6

Network Results Table

	PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (1/s)	Flow (l/s)	
2	0.000	77.680	0.000	0.0	44	0.1	19	0.79	1.75	30.8	1.0	
1	9.001	75.760	0.000	0.0	416	0.9	68	1.22	1.28	22.6	9.5	
1	9.002	74.300	0.000	0.0	416	0.9	94	0.82	0.75	13.3	9.5	
1	9.003	73.905	0.000	0.0	416	0.9	94	0.82	0.75	13.3	9.5	
1	9.004	73.435	0.000	0.0	416	0.9	94	0.82	0.75	13.3	9.5	
1	6.008	71.101	0.000	0.0	1420	3.0	183	0.94	0.82	32.8	32.5	
1	6.009	70.745	0.000	0.0	1420	3.0	183	0.94	0.82	32.8	32.5	

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Network 2019.1			
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PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
14.018	63.614	0.127	500.0	0.000	0	0.0	1.500	0	450	Pipe/Conduit	ď
21.000 21.001 21.002	88.007 92.693 120.162	0.974	95.2	0.000	4196 298 0	0.0	1.500 1.500	0	450	Pipe/Conduit Pipe/Conduit Pipe/Conduit	6 6 6
22.000	77.884	1.520	51.2	0.000	0	0.0	1.500	0	150	Pipe/Conduit	ď
22.001 22.002	42.810 60.689		- • • -	0.000	52 0		1.500 1.500	0 0		Pipe/Conduit Pipe/Conduit	6 6

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)		Cap (1/s)	Flow (1/s)
14.018	68.552	0.000	0.0	4196	8.7	292	0.88	0.80	127.9	96.2
21.000	74.740	0.000	0.0	4196	8.7	292	0.88	0.80	127.9	96.2
21.001	74.564	0.000	0.0	4494	9.4	183	1.69	1.85	294.2	103.0
21.002	73.590	0.000	0.0	4494	9.4	195	1.56	1.66	264.3	103.0
22.000	78.260	0.000	0.0	0	0.0	0	0.00	1.23	21.7	0.0
22.001	76.740	0.000	0.0	52	0.1	19	0.95	2.12	37.5	1.2
22.002	74.240	0.000	0.0	52	0.1	22	0.73	1.46	25.7	1.2

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PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
21.003	58.409	0.470	124.3	0.000	4539		0.0	1.500	0	450	Pipe/Conduit	6
21.004	59.943	0.120	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.005	62.751	0.126	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.006	60.280	0.121	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.007	60.860	0.424	143.5	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.008	103.068	1.430	72.1	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.009	90.980	1.170	77.8	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.010	49.104	1.630	30.1	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.011	66.813	0.134	500.0	0.000	350		0.0	1.500	0	600	Pipe/Conduit	ď
21.012	77.976	0.186	418.4	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (1/s)	Flow (l/s)
21.004 21.005 21.006 21.007 21.008 21.009	72.570 72.100 71.980 71.855 71.734 71.310 69.880 68.710	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	9085 9085 9085 9085 9085 9085 9085 9085	18.9 18.9 18.9 18.9 18.9 18.9 18.9 18.9	308 393 393 266 220 225 174	1.80 1.06 1.06 1.72 2.22 2.16 3.05	1.62 0.97 0.97 1.81 2.56 2.46	257.3 273.6 273.6 273.6 511.9 723.0 696.0 1119.2	208.2 208.2 208.2 208.2 208.2 208.2 208.2 208.2
21.011	67.080 66.946	0.000	0.0	9435 9435	19.7 19.7 19.7 9 Innov	404 379	1.07	0.97	273.6	216.2

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6800 Netherlands		Micro
Date 09/02/2022 11:45	Designed by aga77500	Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	1

PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
21.013	84.630	2.830	29.9	0.000	0		0.0	1.500	0	600	Pipe/Conduit	6
21.014	87.822	4.490	19.6	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.015	136.739	1.250	109.4	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
23.000	128.194	1.140	112.5	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď
23.001	109.491	3.170	34.5	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ě
23.002	102.151	3.490	29.3	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď
23.003	102.006	0.758	134.6	0.000	283		0.0	1.500	0	150	Pipe/Conduit	ď
23.004	68.491	0.509	134.6	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď

<u>Network Results Table</u>

PN	US/IL	Σ Area	Σ Base	Σ Hse	Add Flow	P.Dep	P.Vel	Vel	Cap	Flow	
	(m)	(ha)	Flow (l/s)		(l/s)	(mm)	(m/s)	(m/s)	(l/s)	(1/s)	
21.013	66.760	0.000	0.0	9435	19.7	178	3.09	3.97	1123.3	216.2	
21.014	63.930	0.000	0.0	9435	19.7	159	3.60	4.91	1389.3	216.2	
21.015	59.440	0.000	0.0	9435	19.7	251	1.92	2.07	586.6	216.2	
23.000	79.820	0.000	0.0	0	0.0	0	0.00	0.83	14.6	0.0	
23.001	78.680	0.000	0.0	0	0.0	0	0.00	1.49	26.4	0.0	
23.002	75.510	0.000	0.0	0	0.0	0	0.00	1.62	28.7	0.0	
23.003	72.020	0.000	0.0	283	0.6	74	0.75	0.75	13.3	6.5	
23.004	71.262	0.000	0.0	283	0.6	74	0.75	0.75	13.3	6.5	

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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	

PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(mm)	SECT	(mm)		Design
24.000	95.540	1.000	95.5	0.000	116		0.0	1.500	0	150	Pipe/Conduit	ď
24.001	104.823	0.773	135.6	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď
23.005	73.574	1.944	37.9	0.000	0		0.0	1.500	0	150	Pipe/Conduit	6
23.006	74.759	5.440	13.7	0.000	0		0.0	1.500	0	150	Pipe/Conduit	Ū,
23.007	73.584	0.930	79.1	0.000	0		0.0	1.500	0	150	Pipe/Conduit	- T
23.008	47.087	4.250	11.1	0.000	0		0.0	1.500	0	150	Pipe/Conduit	ď
21.016	80.894	0.290	278.9	0.000	21		0.0	1.500	0	600	Pipe/Conduit	6
21.017	85.231	0.170	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)		Add Flow (l/s)	P.Dep (mm)			-	
24.000	76.690	0.000	0.0	116	0.2	42	0.66	0.90	15.8	2.7
24.001	75.690	0.000	0.0	116	0.2	46	0.58	0.75	13.3	2.7
23.005	70.754	0.000	0.0	399	0.8	63	1.31	1.43	25.2	9.1
23.006	68.810	0.000	0.0	399	0.8	48	1.90	2.37	41.9	9.1
23.007	63.370	0.000	0.0	399	0.8	77	1.00	0.99	17.4	9.1
23.008	62.440	0.000	0.0	399	0.8	45	2.04	2.64	46.7	9.1
21.016	58.190	0.000	0.0	9855	20.5	341	1.36	1.30	366.8	225.8
21.017	57.900	0.000	0.0	9855	20.5	417	1.08	0.97	273.6	225.8
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AD Arnhem		Contraction of the second
6800 Netherlands		Micro
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	1

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PN	Length	Fall	Slope	Area	Houses	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
21.018	93.315	0.187	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	6
21.019	66.366	0.133	500.0	0.000	263		0.0	1.500	0	600	Pipe/Conduit	ď
21.020	47.384	0.095	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.021	100.818	1.685	59.8	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.022	81.883	0.750	109.2	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.023	63.050	0.126	500.0	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
21.024	43.990	0.115	381.3	0.000	0		0.0	1.500	0	600	Pipe/Conduit	ď
25.000	133.481	0.997	133.9	0.000	487		0.0	1.500	0	150	Pipe/Conduit	6
25.001	121.730	0.966	126.0	0.000	111		0.0	1.500	0	150	Pipe/Conduit	ď

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (1/s)	P.Dep (mm)	P.Vel (m/s)		Cap (1/s)	Flow (1/s)
21.018	57.730	0.000	0.0	9855	20.5	417	1.08	0.97	273.6	225.8
21.019	57.543	0.000	0.0	10118	21.1	425	1.08	0.97	273.6	231.9
21.020	57.410	0.000	0.0	10118	21.1	425	1.08	0.97	273.6	231.9
21.021	57.315	0.000	0.0	10118	21.1	221	2.45	2.81	793.8	231.9
21.022	55.630	0.000	0.0	10118	21.1	262	1.96	2.08	587.2	231.9
21.023	54.880	0.000	0.0	10118	21.1	425	1.08	0.97	273.6	231.9
21.024	54.754	0.000	0.0	10118	21.1	385	1.21	1.11	313.5	231.9
25.000	94.340	0.000	0.0	487	1.0	105	0.85	0.76	13.4	11.2
25.001	93.343	0.000	0.0	598	1.2	122	0.89	0.78	13.8	13.7
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P.O. Box 161													
AD Arnhem													100 A
6800 Netherlands													Micco
Date 09/02/2022 11:45						Desigr	ned by aga	77500					Micro
File 10029956-AUK-XX-XX-	м3-с	CW-003	8-Otte	erpool	P	Checke	ed by						Drainac
XP Solutions				-			ck 2019.1						
				Net	work [esign '	Table for	Foul	- Ma	in			
P	'n	Length	Fall	. Slope	Area	Houses	Base	k	HYD	DIA	Section Type	a Auto	
		(m)	(m)	(1:X)	(ha)		Flow (l/s)	(mm)	SECT	(mm)		Design	
25.	002	104.93	3 2.46	7 42.5	0.000	0	0.0	1.500	0	150	Pipe/Conduit	: ď	
				3 126.2				1.500			Pipe/Conduit		
				0 232.6				1.500			Pipe/Conduit		
25.	005	114.383	1 3.56	2 32.1	0.000	0	0.0	1.500	0		Pipe/Conduit		
25.	006	111.193	3 2.67	1 41.6	0.000	69	0.0	1.500	0	225	Pipe/Conduit		
25.	007	98.61	7 2.28	0 43.3	0.000	0	0.0	1.500	0	225	Pipe/Conduit	= 💑	
25.	800	101.663	3 1.55	9 65.2	0.000	0	0.0	1.500	0	225	Pipe/Conduit		
25.	009	131.043	1 8.16	1 16.1	0.000	0	0.0	1.500	0	225	Pipe/Conduit	: d	
26.	000	76.165	5 2.49	5 30.5	0.000	1064	0.0	1.500	0	150	Pipe/Conduit	: d	
					N	etwork	Results I	<u>able</u>					
		PN U	с/тт у	Σ Area				• D D	- D 17-	1 17-	1 Can E1	~~~	
			(m)		Σ Bas Flow (1		lse Add Flow (1/s)	_			1 Cap Fl s) (1/s) (1		
			(-11)	(114)	2.20% (_, 3,	(1,3)	((111/ 5	·, (/	S, (1/S, (1/		
		.002 92					98 1.2			9 1.			
		.003 8		0.000			98 1.2				78 13.8 13		
		.004 88					18 1.				75 29.9 1		
	25	.005 8	8.297	0.000		0.0 7	18 1.	5 69	9 1.5	9 2.	03 80.7 1	6.5	

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1.6

1.6

1.6 77 1.49 1.78 70.9 18.0

2.2 108 1.79 1.59 28.1 24.4

78 1.47 1.75 69.5 18.0

87 1.27 1.42 56.6 18.0

60 2.10 2.87 114.2 18.0

25.006 84.735 0.000

25.007 82.064 0.000

25.008 79.784 0.000 25.009 78.225 0.000

26.000 80.780 0.000

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Designed by aga77500	Desinado
Checked by	Drainage
Network 2019.1	
	Checked by

PN	Length	Fall	Slope	Area	Houses	Ba	se	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
26.001	69.905	0.580	120.5	0.000	0		0.0	1.500	0	225	Pipe/Conduit	æ
26.002	35.445	0.410	86.5	0.000	0		0.0	1.500	0	225	Pipe/Conduit	
26.003	66.428	0.286	232.0	0.000	107		0.0	1.500	0	225	Pipe/Conduit	
26.004	44.046	0.190	232.0	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ă.
26.005	55.064	0.237	232.0	0.000	0		0.0	1.500	0	225	Pipe/Conduit	ď
26.006	52.258	0.225	232.0	0.000	0		0.0	1.500	0	225	Pipe/Conduit	
26.007	88.308	2.442	36.2	0.000	109		0.0	1.500	0	225	Pipe/Conduit	
26.008	115.776	2.210	52.4	0.000	0		0.0	1.500	0	225	Pipe/Conduit	
26.009	99.165	1.640	60.5	0.000	0		0.0	1.500	0	225	Pipe/Conduit	

Network Results Table

PN	US/IL	Σ Area	Σ Base	Σ Hse	Add Flow	P.Dep	P.Vel	Vel	Cap	Flow	
	(m)	(ha)	Flow (l/s)		(1/s)	(mm)	(m/s)	(m/s)	(l/s)	(1/s)	
26.001	78.285	0.000	0.0	1064	2.2	124	1.09	1.05	41.6	24.4	
26.002	77.705	0.000	0.0	1064	2.2	112	1.23	1.23	49.1	24.4	
26.003	77.295	0.000	0.0	1171	2.4	167	0.85	0.75	29.9	26.8	
26.004	77.009	0.000	0.0	1171	2.4	167	0.85	0.75	29.9	26.8	
26.005	76.819	0.000	0.0	1171	2.4	167	0.85	0.75	29.9	26.8	
26.006	76.581	0.000	0.0	1171	2.4	167	0.85	0.75	29.9	26.8	
26.007	76.356	0.000	0.0	1280	2.7	97	1.79	1.91	76.0	29.3	
26.008	73.914	0.000	0.0	1280	2.7	108	1.56	1.59	63.1	29.3	
26.009	71.704	0.000	0.0	1280	2.7	112	1.48	1.48	58.8	29.3	

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6800 Netherlands		Micro
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	1

PN	Length	Fall	Slope	Area	Houses	Ba	se	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(l/s)	(mm)	SECT	(mm)		Design
25.010	103.159	1.824	56.6	0.000	259		0.0	1.500	0	225	Pipe/Conduit	æ
25.011	119.376	2.410	49.5	0.000	88			1.500	0		Pipe/Conduit	
25.012	90.908	1.550	58.7	0.000	0		0.0	1.500	0	225	Pipe/Conduit	
25.013	80.345	0.920	87.3	0.000	0		0.0	1.500	0	300	Pipe/Conduit	
25.014	106.327	0.530	200.6	0.000	81		0.0	1.500	0	300	Pipe/Conduit	
25.015	44.448	1.440	30.9	0.000	91		0.0	1.500	0	300	Pipe/Conduit	Ū,
25.016	122.166	0.730	167.4	0.000	0		0.0	1.500	0	300	Pipe/Conduit	Ū,
25.017	125.378	0.469	267.2	0.000	0		0.0	1.500	0	300	Pipe/Conduit	ď
25.018	118.041	0.386	305.9	0.000	187		0.0	1.500	0	375	Pipe/Conduit	ď

Network Results Table

PN	US/IL	Σ Area	Σ Base	Σ Hse	Add Flow	P.Dep	P.Vel	Vel	Cap	Flow
	(m)	(ha)	Flow (l/s)		(1/s)	(mm)	(m/s)	(m/s)	(l/s)	(1/s)
25.010	70.064	0.000	0.0	2326	4.8	164	1.72	1.53	60.8	53.3
25.011	68.240	0.000	0.0	2414	5.0	160	1.83	1.63	64.9	55.3
25.012	65.830	0.000	0.0	2414	5.0	171	1.70	1.50	59.7	55.3
25.013	64.280	0.000	0.0	2414	5.0	155	1.50	1.48	104.9	55.3
25.014	63.360	0.000	0.0	2495	5.2	208	1.09	0.98	69.1	57.2
25.015	62.830	0.000	0.0	2586	5.4	120	2.26	2.50	176.8	59.3
25.016	61.390	0.000	0.0	2586	5.4	200	1.18	1.07	75.7	59.3
25.017	60.660	0.000	0.0	2586	5.4	244	0.96	0.85	59.8	59.3
25.018	60.191	0.000	0.0	2773	5.8	216	0.97	0.91	101.0	63.5

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6800 Netherlands		Micro
Date 09/02/2022 11:45	Designed by aga77500	Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	ase (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
	91.534 68.053			0.000 0.000	38 0		1.500 1.500	0 0		Pipe/Conduit Pipe/Conduit	ଟ ଟ
	82.032 89.918			0.000 0.000	0 36		1.500 1.500	0 0		Pipe/Conduit Pipe/Conduit	9 9
27.003 27.004	60.252 69.607 63.719 34.294	3.920 4.810	17.8 13.2	0.000 0.000 0.000 0.000	0 0 0	0.0	1.500 1.500 1.500 1.500	0 0 0	150 150	Pipe/Conduit Pipe/Conduit Pipe/Conduit Pipe/Conduit	6 6 6

PN	US/IL (m)		Σ Base Flow (l/s)		Add Flow (l/s)	P.Dep (mm)			Cap (1/s)	Flow (1/s)
27.000	77.470	0.000	0.0	38	0.1	23	0.52	1.02	18.0	0.9
27.001	76.230	0.000	0.0	38	0.1	26	0.42	0.76	13.4	0.9
28.000	76.920	0.000	0.0	0	0.0	0	0.00	0.92	16.3	0.0
28.001	76.010	0.000	0.0	36	0.1	25	0.41	0.76	13.4	0.8
27.002	75.338	0.000	0.0	74	0.2	25	0.91	1.69	29.9	1.7
27.003	73.100	0.000	0.0	74	0.2	22	1.04	2.09	36.9	1.7
27.004	69.180	0.000	0.0	74	0.2	21	1.16	2.42	42.7	1.7
27.005	64.370	0.000	0.0	74	0.2	18	1.40	3.21	56.7	1.7
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AD Arnhem												
6800 Netherlands												Micro
Date 09/02/2022 11:45	5					Design	ned by aga	77500				
File 10029956-AUK-XX-	-XX-M3-0	CW-0038	3-Otte	rpool	P	Checke	ed by					Drainage
XP Solutions						Netwo	ck 2019.1					L
				<u>Net</u>	work D	esign	Table for	Foul	- Mai	<u>n</u>		
	PN	Length	Fall	Slope	Area	Houses	Base	k	HYD	DIA	Section Typ	oe Auto
		(m)	(m)	(1:X)	(ha)		Flow (l/s)	(mm)	SECT ((mm)		Design
	25.019	123.532	2 3.490	35.4	0.000	191	0.0	1.500			Pipe/Condui	
		64.703				0		1.500			Pipe/Condui	it 💣
		63.158				233		1.500			Pipe/Condui	
		94.415				0		1.500			Pipe/Condui	· · · · · · · · · · · · · · · · · · ·
	25.023	35.220	0.078	452.5	0.000	0	0.0	1.500	0	375 :	Pipe/Condui	it 💣
	21.025	76.954	0.809	95.2	0.000	0	0.0	1.500	0	600	Pipe/Condui	it 💣
	21.026	93.941	0.188	500.0	0.000	0		1.500	0	675	Pipe/Condui	
	21.027	60.216	6 0.120	500.0	0.000	0	0.0	1.500	0	675	Pipe/Condui	it 💣
					Ne	twork	<u>Results T</u>	<u>able</u>				
		PN U	s/il Σ	Area	Σ Bas	ο Σ.F	ise Add Flow	7 P Den	P Vel	Vel	Cap F	low
					Flow (1		(1/s)	-			s) (1/s) (1	
	25	5.019 59	9.805	0.000		0.0 30	38 6.3	3 123	2.21	2.7	70 298.1 6	69.6
		5.020 56				0.0 30					5 237.4 6	
	25	5.021 55	5.155	0.000		0.0 32	.71 6.8	3 232	1.04	0.9	97 106.7 7	75.0
	25	5.022 54	1.925	0.000		0.0 32	.71 6.8	280	0.85	0.7	75 83.0 7	75.0
	25	5.023 54	1.716	0.000		0.0 32	.71 6.8	280	0.85	0.7	75 83.0 7	75.0
	21	.025 54	1.639	0.000		0.0 133	89 27.9	296	2.21	2.2	22 629.0 30	06.8
		.026 53				0.0 133)4 373.3 30	
		.027 53				0.0 133)4 373.3 30	

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P.O. Box 161													
AD Arnhem													
6800 Netherlands													Micro
Date 09/02/2022 11	:45				Design	ned by	aga	77500)				Drainage
File 10029956-AUK-2	ХХ-ХХ-МЗ-СW-О	038-Ott	erpool	P	Checke	ed by							brainage
XP Solutions					Networ	k 201	9.1						
			Net	work De	sign '	Table	for	Foul	- Ma	in			
	PN Leng	gth Fall	l Slope	Area H	louses	Base	9	k	HYD	DIA S	ection T	ype Aı	uto
	(m		(1:X)			Flow (]	L/s)	(mm)					sign
	21.028 91.9	924 0.47	7 192.8	0.000	0		0.0	1.500	0	675 P	ipe/Cond	uit.	đ
	21.029 75.9				0			1.500			ipe/Cond	,	ř
	21.030 11.0	0.02	2 500.0	0.000	39		0.0	1.500	0	675 P:	ipe/Cond	uit	ซ์
				Ne	twork	Resul	ts T	<u>able</u>					
	PN			Σ Base				-	-		_		
		(m)	(ha)	Flow (1,	s)	()	L/s)	(mm)	(m/s	s) (m/s) (l/s)	(l/s)	
	21.028	53.522	0.000	(0.0 133	89					8 602.3		
		53.045			0.0 133						4 373.3		
	21.030	52.893	0.000	(0.0 134	28	28.0	469	9 1.1	.6 1.0	4 373.3	307.7	
				©	1982-2	019 I	nnov	yze					

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AD Arnhem		and the second s
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Date 09/02/2022 11:45	Designed by aga77500	Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Dramaye
XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
FR11350901	101.260	1.350	Open Manhole	1200	1.000	99.910	150				
FR11351901	100.830	1.768	Open Manhole	1200	1.001	99.062	150	1.000	99.062	150	
FR11352801	99.860	1.728	Open Manhole	1200	1.002	98.132	225	1.001	98.132	150	
FR11353801	98.950	1.425	Open Manhole	1200	1.003	97.525	225	1.002	97.525	225	
FR11354402	105.500	1.350	Open Manhole	1200	2.000	104.150	150				
FR11354401	104.840	1.350	Open Manhole	1200	2.001	103.490	150	2.000	103.490	150	
TR11354601	103.210	1.350	Open Manhole	1200	2.002	101.860	150	2.001	101.860	150	
FR11355701	100.930	1.350	Open Manhole	1200	2.003	99.580	150	2.002	99.580	150	
FR11354801	98.600	1.566	Junction		1.004	97.034	225	1.003	97.034	225	
								2.003	97.034	150	
FR11356801	97.610	1.425	Open Manhole	1200	1.005	96.185	225	1.004	96.185	225	
TR11356802	94.520	1.425	Open Manhole	1200	1.006	93.095	225	1.005	93.095	225	
FR11357902	88.500	1.425	Open Manhole	1200	1.007	87.075	225	1.006	87.075	225	
FR11368001	80.530	1.500	Open Manhole	1200	1.008	79.030	300	1.007	79.030	225	
FR11367001	81.550	2.789	Open Manhole	1200	1.009	78.761	300	1.008	78.761	300	
FR11366101	86.210	7.840	Open Manhole	1200	1.010	78.370	300	1.009	78.370	300	
FR11366201	80.890	2.738	Open Manhole	1200	1.011	78.152	300	1.010	78.152	300	
FR11366303	78.260	1.500	Open Manhole	1200	1.012	76.760	300	1.011	76.760	300	

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6800 Netherlands		Micro
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	

Backdrop (mm)	Diameter (mm)	Pipes In Invert Level (m)	PN	Diameter (mm)	Pipe Out Invert Level (m)	PN	MH Diam.,L*W (mm)	MH Connection	MH Depth (m)	MH CL (m)	MH Name
	300	74.170	1.012	300	74.170	1.013	1200	Open Manhole	1.500	75.670	TR11367301
	ſ			150	73.600	3.000	1200	Open Manhole	1.350	74.950	TR11369101
	150	73.006	3.000	150	73.006	3.001	1200	Open Manhole	3.794	76.800	TR11369201
	150	72.212	3.001	150	72.212	3.002	1200	Open Manhole	3.528	75.740	TR11369203
1140	300	72.680	1.013	300	71.540	1.014		Junction	2.640	74.180	TR11368301
	150	71.540	3.002								
	300	71.316	1.014	300	71.316	1.015	1200	Open Manhole	2.094	73.410	TR11368401
	300	71.009	1.015	300	71.009	1.016	1200	Open Manhole	2.471	73.480	TR11368501
	ſ			150	68.720	4.000	1200	Open Manhole	1.350	70.070	TR11368702
	150	68.140	4.000	150	68.140	4.001	1200	Open Manhole	2.020	70.160	TR11368701
2140	300	69.750	1.016	300	67.610	1.017		Junction	3.640	71.250	TR11368601
	150	67.610	4.001								
	300	67.485	1.017	300	67.485	1.018	1200	Open Manhole	3.585	71.070	TR11367602
	ſ			150	70.640	5.000	1200	Open Manhole	1.350	71.990	TR11366701
	300	67.273	1.018	300	67.273	1.019		Junction	4.047	71.320	TR11366601
2397	150	69.820	5.000								
	300	66.838	1.019	300	66.838	1.020	1200	Open Manhole	5.702	72.540	TR11365601
	300	66.630	1.020	300	66.630	1.021	1200	Open Manhole	4.290	70.920	TR11365702

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AD Arnhem		Contraction of the second
6800 Netherlands		Micro
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	· · ·

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR11366702	72.330	1.350	Open Manhole	1200	6.000	70.980	150				
TR11366703	71.070	1.350	Open Manhole	1200	6.001	69.720	150	6.000	69.720	150	
TR11365701	66.830	1.500	Junction		1.022	65.330	300	1.021	65.330	300	
								6.001	65.330	150	
TR11366901	70.520	1.350	Open Manhole	1200	7.000	69.170	150				
TR11365903	69.600	1.350	Open Manhole	1200	7.001	68.250	150	7.000	68.250	150	
TR11365902	68.470	1.350	Open Manhole	1200	7.002	67.120	150	7.001	67.120	150	
TR11364902	66.460	1.500	Junction		1.023	64.960	300	1.022	64.960	300	
								7.002	64.960	150	
TR11364801	67.320	2.456	Open Manhole	1200	1.024	64.864	300	1.023	64.864	300	
TR11364901	67.270	2.533	Open Manhole	1200	1.025	64.737	300	1.024	64.737	300	
TR11363901	67.980	3.404	Open Manhole	1200	1.026	64.576	300	1.025	64.576	300	
TR11363902	66.960	2.639	Open Manhole	1200	1.027	64.321	300	1.026	64.321	300	
TR11364701	68.370	1.350	Open Manhole	1200	8.000	67.020	150				
TR11363802	70.070	3.705	Open Manhole	1200	8.001	66.365	150	8.000	66.365	150	
TR11363801	70.320	4.587	Open Manhole	1200	8.002	65.733	150	8.001	65.733	150	
TR11361801	69.610	1.350	Open Manhole	1200	9.000	68.260	150				
TR11362801	69.160	3.885	Junction		8.003	65.275	150	8.002	65.275	150	

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6800 Netherlands		Micro
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
								9.000	67.331	150	2055
TR11360802	67.910	1.350	Open Manhole	1200	10.000	66.560	150				
TR11361901	66.390	1.350	Open Manhole	1200	10.001	65.040	150	10.000	65.040	150	
TR11361902	64.735	1.350	Open Manhole	1200	10.002	63.385	150	10.001	63.385	150	
FR11362901	66.580	3.562	Open Manhole	1200	10.003	63.018	150	10.002	63.018	150	
FR11362902	66.820	4.156	Junction		1.028	62.664	375	1.027	64.186	300	1447
								8.003	64.250	150	1361
								10.003	62.664	150	
FR11373001	67.380	4.964	Open Manhole	1350	1.029	62.416	375	1.028	62.416	375	
FR11372002	65.840	3.612	Open Manhole	1350	1.030	62.228	375	1.029	62.228	375	
FR11372102	66.720	4.552	Open Manhole	1350	1.031	62.168	375	1.030	62.168	375	
FR11372103	68.490	6.441	Open Manhole	1350	1.032	62.049	375	1.031	62.049	375	
rR11372202	64.900	1.350	Open Manhole	1200	11.000	63.550	150				
FR11372201	65.090	1.964	Open Manhole	1200	11.001	63.126	150	11.000	63.126	150	
FR11372203	67.730	5.826	Open Manhole	1350	1.033	61.904	375	1.032	61.904	375	
								11.001	62.908	150	779
FR11373201	66.200	4.396	Open Manhole	1350	1.034	61.804	375	1.033	61.804	375	
rR11373301	65.970	4.380	Open Manhole	1350	1.035	61.590	375	1.034	61.590	375	

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6800 Netherlands		Micro
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XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
IR11374301	65.940	4.473	Open Manhole	1350	1.036	61.467	375	1.035	61.467	375	
FR11370501	64.209	1.350	Open Manhole	1200	12.000	62.859	150				
FR11371501	66.199	4.402	Open Manhole	1200	12.001	61.797	150	12.000	61.797	150	
FR11372401	64.799	3.887	Open Manhole	1200	12.002	60.912	150	12.001	60.912	150	
FR11373401	62.320	2.153	Open Manhole	1200	12.003	60.167	150	12.002	60.167	150	
FR11376102	69.790	1.350	Open Manhole	1200	13.000	68.440	150				
FR11376101	69.650	1.778	Open Manhole	1200	13.001	67.872	150	13.000	67.872	150	
FR11377103	70.070	2.848	Open Manhole	1200	13.002	67.222	150	13.001	67.222	150	
FR11378102	70.490	3.735	Open Manhole	1200	13.003	66.755	150	13.002	66.755	150	
FR11379101	71.030	4.935	Open Manhole	1200	13.004	66.095	150	13.003	66.095	150	
FR11379102	71.730	5.972	Open Manhole	1200	13.005	65.758	150	13.004	65.758	150	
FR11379201	72.790	7.642	Open Manhole	1200	13.006	65.148	150	13.005	65.148	150	
FR11378201	72.290	7.827	Open Manhole	1200	13.007	64.463	150	13.006	64.463	150	
FR11378301	72.550	8.436	Open Manhole	1200	13.008	64.114	150	13.007	64.114	150	
FR11377301	69.130	5.969	Open Manhole	1200	13.009	63.161	150	13.008	63.161	150	
FR11377302	67.550	4.717	Open Manhole	1200	13.010	62.833	150	13.009	62.833	150	
FR11376301	66.540	4.185	Open Manhole	1200	13.011	62.355	150	13.010	62.355	150	
rR11375401	65.940	4.440	Open Manhole	1200	13.012	61.500	150	13.011	61.500	150	

Manhole Schedules for Foul - Main

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6800 Netherlands		Micro
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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR11374401	65.280	5.793	Open Manhole	1350	1.037	59.487	450	1.036	61.263	375	1700
								12.003	59.487	150	
								13.012	61.067	150	1280
			Open Manhole	0		OUTFALL		1.037	59.467	450	
			Open Manhole		14.000	79.350	150				
TR13361602	84.890	1.350	Open Manhole	1200	15.000	83.540	150				
TR13363701	82.390	1.350	Open Manhole	1200	15.001	81.040	150	15.000	81.040	150	
TR13364802	79.920	1.556	Junction		14.001	78.364	150	14.000	78.364	150	
								15.001	78.570	150	206
TR13363801	79.990	2.317	Open Manhole	1200	14.002	77.673	150	14.001	77.673	150	
TR13363901	79.060	1.998	Open Manhole	1200	14.003	77.062	150	14.002	77.062	150	
TR13373002	77.650	1.350	Open Manhole	1200	14.004	76.300	150	14.003	76.300	150	
TR13373001	78.040	2.238	Open Manhole	1200	14.005	75.802	225	14.004	75.802	150	
TR13371101	79.750	4.432	Open Manhole	1200	14.006	75.318	225	14.005	75.318	225	
TR13370101	81.460	6.651	Open Manhole	1200	14.007	74.809	225	14.006	74.809	225	
TR12379101	78.945	4.621	Open Manhole	1200	14.008	74.324	225	14.007	74.324	225	
TR12378101	75.860	2.041	Open Manhole	1200	14.009	73.819	225	14.008	73.819	225	

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6800 Netherlands		Micro
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XP Solutions	Network 2019.1	I

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR12377201	75.580	2.094	Open Manhole	1200	14.010	73.486	225	14.009	73.486	225	
TR12377101	75.790	2.609	Open Manhole	1200	14.011	73.181	225	14.010	73.181	225	
TR12376101	75.420	2.552	Open Manhole	1200	14.012	72.868	225	14.011	72.868	225	
TR12376001	74.110	1.557	Open Manhole	1200	14.013	72.553	225	14.012	72.553	225	
TR12366901	72.180	1.425	Open Manhole	1200	14.014	70.755	225	14.013	70.755	225	
TR12365801	71.090	1.425	Open Manhole	1200	14.015	69.665	225	14.014	69.665	225	
100	70.500	1.500	Open Manhole	1200	14.016	69.000	300	14.015	69.000	225	
101	71.400	2.667	Open Manhole	1350	14.017	68.733	375	14.016	68.733	300	
TR13361601	88.650	1.350	Open Manhole	1200	16.000	87.300	150				
TR13360501	90.730	4.179	Open Manhole	1200	16.001	86.551	150	16.000	86.551	150	
TR12369401	87.920	2.194	Open Manhole	1200	16.002	85.726	150	16.001	85.726	150	
TR12369402	85.790	1.350	Open Manhole	1200	16.003	84.440	150	16.002	84.440	150	
TR12368401	81.360	1.350	Open Manhole	1200	16.004	80.010	150	16.003	80.010	150	
TR12367401	79.870	1.350	Open Manhole	1200	16.005	78.520	150	16.004	78.520	150	
TR12366501	76.260	1.350	Open Manhole	1200	16.006	74.910	150	16.005	74.910	150	
TR12365501	75.780	1.737	Open Manhole	1200	16.007	74.043	150	16.006	74.043	150	
TR11369202	77.240	1.350	Open Manhole	1200	17.000	75.890	150				
TR12360301	78.940	3.832	Open Manhole	1200	17.001	75.108	150	17.000	75.108	150	

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XP Solutions	Network 2019.1	L

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR12360401	78.340	4.049	Open Manhole	1200	17.002	74.291	150	17.001	74.291	150	
FR12361501	77.890	4.300	Open Manhole	1200	17.003	73.590	150	17.002	73.590	150	
IR12360602	75.970	1.350	Open Manhole	1200	18.000	74.620	150				
IR12361502	75.080	1.350	Open Manhole	1200	18.001	73.730	150	18.000	73.730	150	
TR12361601	74.870	1.350	Open Manhole	1200	18.002	73.520	150	18.001	73.520	150	
TR12362501	76.040	3.175	Junction		17.004	72.865	150	17.003	73.150	150	285
								18.002	72.865	150	
TR12362502	75.580	3.140	Open Manhole	1200	17.005	72.440	150	17.004	72.440	150	
TR12363503	74.780	2.770	Open Manhole	1200	17.006	72.010	150	17.005	72.010	150	
TR12363504	74.410	2.821	Open Manhole	1200	17.007	71.589	150	17.006	71.589	150	
TR12362301	79.670	1.350	Open Manhole	1200	19.000	78.320	150				
TR12363301	79.030	1.350	Open Manhole	1200	20.000	77.680	150				
TR12363401	77.110	1.350	Junction		19.001	75.760	150	19.000	75.760	150	
								20.000	75.760	150	
TR12363505	75.650	1.350	Open Manhole	1200	19.002	74.300	150	19.001	74.300	150	
TR12363501	75.310	1.405	Open Manhole	1200	19.003	73.905	150	19.002	73.905	150	
TR12364501	75.970	2.535	Open Manhole	1200	19.004	73.435	150	19.003	73.435	150	
TR12364502	74.870	3.769	Junction		16.008	71.101	225	16.007	73.336	150	2161

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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
								17.007	71.101	150	
								19.004	73.154	150	1978
TR12364601	73.500	2.755	Open Manhole	1200	16.009	70.745	225	16.008	70.745	225	
102	72.700	4.148	Open Manhole	1350	14.018	68.552	450	14.017	68.552	375	
								16.009	70.603	225	1825
PS1	73.600	5.175	Open Manhole	0		OUTFALL		14.018	68.425	450	
TR11362602	76.390	1.650	Open Manhole	1350	21.000	74.740	450				
TR11361701	76.470	1.906	Open Manhole	1350	21.001	74.564	450	21.000	74.564	450	
TR11360702	75.240	1.650	Open Manhole	1350	21.002	73.590	450	21.001	73.590	450	
TR10367702	79.610	1.350	Open Manhole	1200	22.000	78.260	150				
TR10368701	78.090	1.350	Open Manhole	1200	22.001	76.740	150	22.000	76.740	150	
TR10369701	75.590	1.350	Open Manhole	1200	22.002	74.240	150	22.001	74.240	150	
TR10369802	74.220	1.650	Junction		21.003	72.570	450	21.002	72.570	450	
								22.002	72.570	150	
TR10369801	73.900	1.800	Open Manhole	1500	21.004	72.100	600	21.003	72.100	450	
TR10368901	74.160	2.180	Open Manhole	1500	21.005	71.980	600	21.004	71.980	600	
TR10368902	74.390	2.535	Open Manhole	1500	21.006	71.855	600	21.005	71.855	600	

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XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdro <u>r</u> (mm)
TR10378001	74.010	2.276	Open Manhole	1500	21.007	71.734	600	21.006	71.734	600	
TR10378101	73.110	1.800	Open Manhole	1500	21.008	71.310	600	21.007	71.310	600	
TR10378201	71.680	1.800	Open Manhole	1500	21.009	69.880	600	21.008	69.880	600	
TR10378202	70.510	1.800	Open Manhole	1500	21.010	68.710	600	21.009	68.710	600	
TR10378301	68.880	1.800	Junction		21.011	67.080	600	21.010	67.080	600	
TR10377301	69.090	2.144	Open Manhole	1500	21.012	66.946	600	21.011	66.946	600	
TR10376201	68.560	1.800	Open Manhole	1500	21.013	66.760	600	21.012	66.760	600	
TR10376301	65.730	1.800	Open Manhole	1500	21.014	63.930	600	21.013	63.930	600	
TR10376401	61.240	1.800	Open Manhole	1500	21.015	59.440	600	21.014	59.440	600	
TR10367701	81.170	1.350	Open Manhole	1200	23.000	79.820	150				
TR10366801	80.030	1.350	Open Manhole	1200	23.001	78.680	150	23.000	78.680	150	
TR10366901	76.860	1.350	Open Manhole	1200	23.002	75.510	150	23.001	75.510	150	
TR10376001	73.370	1.350	Open Manhole	1200	23.003	72.020	150	23.002	72.020	150	
TR10375001	73.700	2.438	Open Manhole	1200	23.004	71.262	150	23.003	71.262	150	
TR10373201	78.040	1.350	Open Manhole	1200	24.000	76.690	150				
TR10374101	77.040	1.350	Open Manhole	1200	24.001	75.690	150	24.000	75.690	150	
TR10374001	76.370	5.616	Junction		23.005	70.754	150	23.004	70.754	150	
								24.001	74.917	150	416

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XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR10375101	70.160	1.350	Open Manhole	1200	23.006	68.810	150	23.005	68.810	150	
TR10375201	64.720	1.350	Open Manhole	1200	23.007	63.370	150	23.006	63.370	150	
TR10374301	63.790	1.350	Open Manhole	1200	23.008	62.440	150	23.007	62.440	150	
TR10374302	59.990	1.800	Junction		21.016	58.190	600	21.015	58.190	600	
								23.008	58.190	150	
TR10374401	59.700	1.800	Open Manhole	1500	21.017	57.900	600	21.016	57.900	600	
TR10373401	62.490	4.760	Open Manhole	1500	21.018	57.730	600	21.017	57.730	600	
TR10373501	60.450	2.907	Open Manhole	1500	21.019	57.543	600	21.018	57.543	600	
TR10372501	62.480	5.070	Open Manhole	1500	21.020	57.410	600	21.019	57.410	600	
TR10372601	60.680	3.365	Open Manhole	1500	21.021	57.315	600	21.020	57.315	600	
TR10371502	57.430	1.800	Open Manhole	1500	21.022	55.630	600	21.021	55.630	600	
TR10370501	56.680	1.800	Open Manhole	1500	21.023	54.880	600	21.022	54.880	600	
TR09379501	57.050	2.296	Open Manhole	1500	21.024	54.754	600	21.023	54.754	600	
TR10356901	95.690	1.350	Open Manhole	1200	25.000	94.340	150				
TR10366001	95.480	2.137	Open Manhole	1200	25.001	93.343	150	25.000	93.343	150	
TR10366101	94.090	1.713	Open Manhole	1200	25.002	92.377	150	25.001	92.377	150	
TR10366301	91.260	1.350	Open Manhole	1200	25.003	89.910	150	25.002	89.910	150	
TR10365401	90.660	1.793	Open Manhole	1200	25.004	88.867	225	25.003	88.867	150	

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XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR10365501	90.270	1.973	Open Manhole	1200	25.005	88.297	225	25.004	88.297	225	
TR10365601	86.160	1.425	Open Manhole	1200	25.006	84.735	225	25.005	84.735	225	
TR10364601	83.489	1.425	Open Manhole	1200	25.007	82.064	225	25.006	82.064	225	
TR10363601	81.209	1.425	Open Manhole	1200	25.008	79.784	225	25.007	79.784	225	
TR10363501	79.650	1.425	Open Manhole	1200	25.009	78.225	225	25.008	78.225	225	
TR10354901	82.130	1.350	Open Manhole	1200	26.000	80.780	150				
TR10364001	79.710	1.425	Open Manhole	1200	26.001	78.285	225	26.000	78.285	150	
TR10363101	79.130	1.425	Open Manhole	1200	26.002	77.705	225	26.001	77.705	225	
TR10363102	78.720	1.425	Open Manhole	1200	26.003	77.295	225	26.002	77.295	225	
TR10364101	80.260	3.251	Open Manhole	1200	26.004	77.009	225	26.003	77.009	225	
TR10364201	78.720	1.901	Open Manhole	1200	26.005	76.819	225	26.004	76.819	225	
TR10364202	79.540	2.959	Open Manhole	1200	26.006	76.581	225	26.005	76.581	225	
TR10364301	78.919	2.563	Open Manhole	1200	26.007	76.356	225	26.006	76.356	225	
TR10363301	75.339	1.425	Open Manhole	1200	26.008	73.914	225	26.007	73.914	225	
TR10362401	73.129	1.425	Open Manhole	1200	26.009	71.704	225	26.008	71.704	225	
TR10362501	71.489	1.425	Junction		25.010	70.064	225	25.009	70.064	225	
								26.009	70.064	225	
TR10361501	69.740	1.500	Open Manhole	1200	25.011	68.240	225	25.010	68.240	225	

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File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
TR10360501	67.330	1.500	Open Manhole	. 1200	25.012	65.830	225	25.011	65.830	225	
TR09369601	65.780	1.500	Open Manhole	1200	25.013	64.280	300	25.012	64.280	225	
TR09368601	64.860	1.500	Open Manhole	1200	25.014	63.360	300	25.013	63.360	300	
TR09368702	64.330	1.500	Open Manhole	1200	25.015	62.830	300	25.014	62.830	300	
TR09368801	62.890	1.500	Open Manhole	1200	25.016	61.390	300	25.015	61.390	300	
TR09368901	62.160	1.500	Open Manhole	1200	25.017	60.660	300	25.016	60.660	300	
TR09378001	62.110	1.919	Open Manhole	1350	25.018	60.191	375	25.017	60.191	300	
TR10372201	78.820	1.350	Open Manhole	1200	27.000	77.470	150				
TR10371102	77.580	1.350	Open Manhole	1200	27.001	76.230	150	27.000	76.230	150	
TR10360901	78.270	1.350	Open Manhole	1200	28.000	76.920	150				
TR10371001	77.360	1.350	Open Manhole	1200	28.001	76.010	150	28.000	76.010	150	
TR10371101	77.200	1.862	Junctior	L	27.002	75.338	150	27.001	75.721	150	383
								28.001	75.338	150	
TR10370101	74.450	1.350	Open Manhole	1200	27.003	73.100	150	27.002	73.100	150	
TR10370102	70.530	1.350	Open Manhole	1200	27.004	69.180	150	27.003	69.180	150	
TR09379101	65.720	1.350	Open Manhole	1200	27.005	64.370	150	27.004	64.370	150	
TR09379103	61.380	1.575	Junctior	ı	25.019	59.805	375	25.018	59.805	375	
								27.005	59.805	150	

Manhole Schedules for Foul - Main

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P.O. Box 161		
AD Arnhem		
6800 Netherlands		Micro
Date 09/02/2022 11:45	Designed by aga77500	Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	l.

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdror (mm)
TR09379201	57.890	1.575	Open Manhole	1350	25.020	56.315	375	25.019	56.315	375	
TR09379301	56.730	1.575	Open Manhole	1350	25.021	55.155	375	25.020	55.155	375	
TR09379401	56.500	1.575	Open Manhole	1350	25.022	54.925	375	25.021	54.925	375	
TR09379503	56.450	1.734	Open Manhole	1350	25.023	54.716	375	25.022	54.716	375	
TR09379502	56.840	2.201	Junction		21.025	54.639	600	21.024	54.639	600	
								25.023	54.639	375	
TR09378601	55.780	1.950	Open Manhole	1500	21.026	53.830	675	21.025	53.830	600	
TR09377602	56.330	2.688	Open Manhole	1500	21.027	53.642	675	21.026	53.642	675	
TR09377601	57.510	3.988	Open Manhole	1500	21.028	53.522	675	21.027	53.522	675	
TR09376601	54.920	1.875	Open Manhole	1500	21.029	53.045	675	21.028	53.045	675	
TR09375602	55.330	2.437	Open Manhole	1500	21.030	52.893	675	21.029	52.893	675	
nsite WwTW	55.970	3.099	Open Manhole	0		OUTFALL		21.030	52.871	675	

Arcadis SSC Europe B.V							Page 43
P.O. Box 161							
AD Arnhem							
6800 Netherlands				gned by aga			Micro
Date 09/02/2022 11:45	Drainage						
File 10029956-AUK-XX-XX-M3-CW	-0038-0	tterpool 1		ked by			Drainage
XP Solutions			Netwo	ork 2019.1			
		Man	hole Sched	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
TRI	11350901	611062.671	135984.967	611062.671	135984.967	Required	•
TR!	11351901	611164.889	135935.408	611164.889	135935.408	Required	
TR:	11352801	611282.401	135894.423	611282.401	135894.423	Required	
TR:	11353801	611373.978	135871.689	611373.978	135871.689	Required	~
TR:	11354402	611415.857	135438.931	611415.857	135438.931	Required	
TR	11354401	611457.891	135472.311	611457.891	135472.311	Required	
TR	11354601	611486.326	135603.358	611486.326	135603.358	Required	
TR:	11355701	611504.589	135740.957	611504.589	135740.957	Required	
			©1982-	-2019 Innovy	/ze		1

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P.O. Box 161							
AD Arnhem							
6800 Netherlands				gned by aga			Micro
Date 09/02/2022 11:45	Drainage						
File 10029956-AUK-XX-XX-M	brainage						
XP Solutions			Netw	ork 2019.1			
		Man	hole Sche	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	
	TR11354801	611488.028	135870.570	611488.028		Required	
	TR11356801	611607.681	135867.705	611607.681	135867.705	Required	1
	TR11356802	611693.216	135886.912	611693.216	135886.912	Required	
	TR11357902	611755.408	135949.104	611755.408	135949.104	Required	
	TR11368001	611826.511	136034.193	611826.511	136034.193	Required	
	TR11367001	611749.114	136079.928	611749.114	136079.928	Required	$\langle \rangle$
	TR11366101	611666.791	136181.952	611666.791	136181.952	Required	
	TR11366201	611623.167	136240.352	611623.167	136240.352	Required	
			©1982	-2019 Innovy	Ze		

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P.O. Box 161		
AD Arnhem		The second second
6800 Netherlands		Micro
	ed by aga77500	Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P Checked	_	bianage
XP Solutions Network	< 2019.1	
Manhole Schedul	les for Foul - Main	
	ntersection Intersection Manhole Layout Easting Northing Access (North) (m) (m)	
TR11366303 611673.475 136326.544	611673.475 136326.544 Required	
TR11367301 611738.208 136322.322	611738.208 136322.322 Required	
TR11369101 611931.130 136144.513	611931.130 136144.513 Required	
TR11369201 611974.749 136211.014	611974.749 136211.014 Required	
TR11369203 611903.243 136289.671	611903.243 136289.671 Required	
TR11368301 611853.248 136364.539	611853.248 136364.539 Required	
TR11368401 611854.303 136439.474	611854.303 136439.474 Required	
TR11368501 611832.492 136539.738	611832.492 136539.738 Required	
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P.O. Box 161							
AD Arnhem							
6800 Netherlands				gned by aga			Micro
Date 09/02/2022 11:45	Drainage						
File 10029956-AUK-XX-XX-M3-C	W-0038-0	tterpool 1		ked by			brainage
XP Solutions			Netw	ork 2019.1			
		Man	hole Sche	edules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)		Intersection Northing (m)	Manhole Access	
TI	R11368702	611865.411	136783.929	611865.411	136783.929	Required	۶
т	R11368701	611822.027	136719.448	611822.027	136719.448	Required	
TI	R11368601	611802.829	136651.169	611802.829	136651.169	Required	
TI	R11367602	611761.668	136658.168	611761.668	136658.168	Required	1
TI	R11366701	611692.830	136728.612	611692.830	136728.612	Required	
TI	R11366601	611690.778	136657.231	611690.778	136657.231	Required	
TI	R11365601	611545.983	136643.802	611545.983	136643.802	Required	-
TI	R11365702	611544.549	136713.150	611544.549	136713.156	Required	
			©1982	-2019 Innovy	7Ze		1

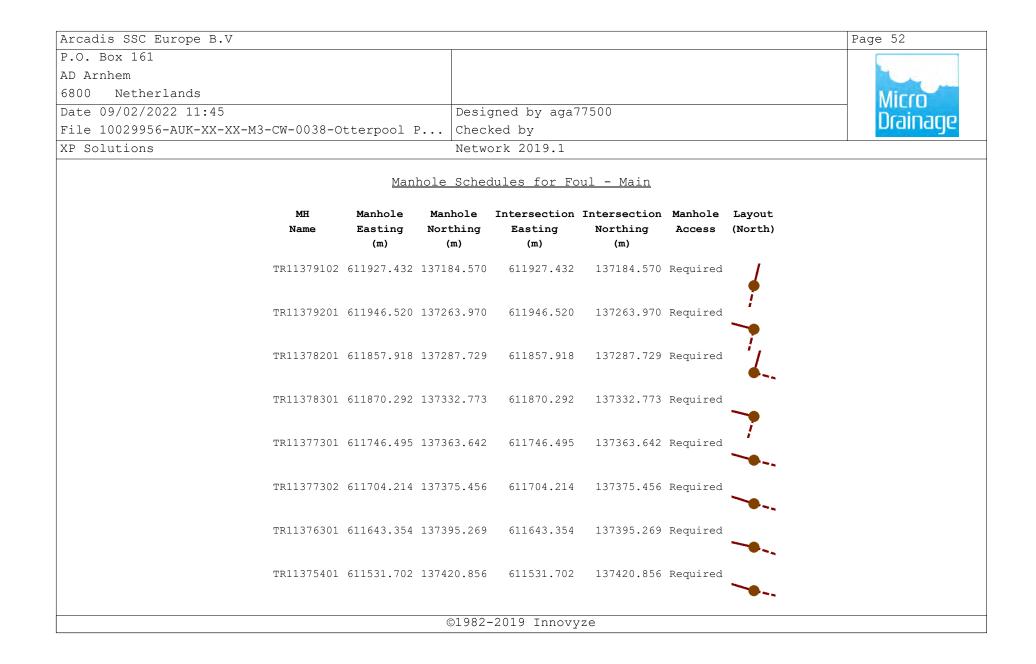
Arcadis SSC Europe B.V							Page 47
P.O. Box 161							
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File 10029956-AUK-XX-XX-	M3-CW-0038-0	tterpool 1	P Chec	ked by			Drainage
XP Solutions			Netw	ork 2019.1			
		Man	hole Sche	dules for Fo	oul - Main		
	MH Name	Manhole Easting	Manhole Northing	Intersection Easting	Intersection Northing	Manhole Access	-
	Name	mascing (m)	(m)	(m)	(m)	Access	
		(11005 500	100707 004				
	TR11366702	611695.509	136/9/.824	611695.509	136797.824	Required	
	TR11366703	611631.465	136797.202	611631.465	136797.202	Required	
							—————
	TR11365701	611533.268	136797.333	611533.268	136797.333	Required	N State Stat
							<i>\$</i>
	TR11366901	611646.760	136953 389	611646 760	136953.389	Required	
	11(11)000001	011040.700	100000.000	011040.700	130933.309	nequirea	-
	TR11365903	611591.277	136937.467	611591.277	136937.467	Required	····
	TR11365902	611533.510	136924.697	611533.510	136924.697	Required	
	TR11364902	611496.703	136900.504	611496.703	136900.504	Required	
						-	- Par
	mp11264001	611460 661	126001 001	611460 661	126001 061	Domina 1	
	TK11364801	011409.001	T202AT'20T	011409.001	136891.861	кеquired	
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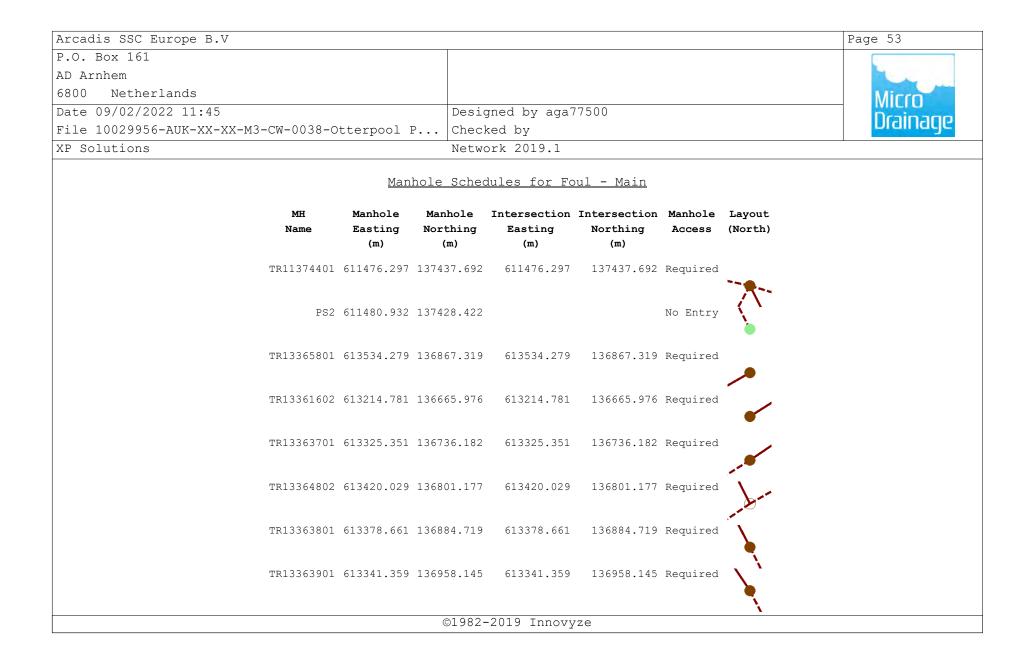
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P.O. Box 161							
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File 10029956-AUK-XX-XX-	M3-CW-0038-0	tterpool i	P Chec	ked by			Drainage
XP Solutions			Netw	ork 2019.1			
		Man	hole Sched	dules for Fo	oul - Main		
	MH Name	Manhole Easting	Manhole Northing	Easting	Intersection Northing		Layout (North)
		(m)	(m)	(m)	(m)		
	TR11364901	611434.393	136905.239	611434.393	136905.239	Required	
	11(11001901	011101.000	100000.200	011101.000	100000.200	nequirea	·
	TR11363901	611386.962	136908.279	611386.962	136908.279	Required	~
	TR11363902	611320.074	136942.940	611320.074	136942.940	Required	
	TR11364701	611484.726	136798.445	611484.726	136798.445	Required	
	mp11262002	611207 155	136804.249	611207 155	136804.249	Domirod	
	1K11505002	011397.133	130004.249	011397.133	130004.249	Required	
							•
	TR11363801	611312.669	136807.214	611312.669	136807.214	Required	
	TR11361801	611130.832	136844.161	611130.832	136844.161	Required	
							•
	TR11362801	611251.898	136815.366	611251.898	136815.366	Required	I
	11(11002001	511201.090	100010.000	311231.090	100010.000		<u>4</u>
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Arcadis SSC Europe B.V							Page 49	
P.O. Box 161								
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Date 09/02/2022 11:45	Draina	ane						
File 10029956-AUK-XX-XX	Brank	biainage						
XP Solutions			Netw	ork 2019.1				
		Man	hole Sche	dules for Fo	oul - Main			
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)			
	TR11360802	611097.516	136886.388	611097.516	136886.388	Required	 Image: A set of the set of the	
	TR11361901	611148.595	136928.954	611148.595	136928.954	Required		
	TR11361902	611185.080	136971.520	611185.080	136971.520	Required	· · · · · · · · · · · · · · · · · · ·	
	TR11362901	611233.726	136960.574	611233.726	136960.574	Required		
	TR11362902	611280.548	136949.629	611280.548	136949.629	Required		
	TR11373001	611308.520	137058.475	611308.520	137058.475	Required	-	
	TR11372002	611228.862	137088.879	611228.862	137088.879	Required		
	TR11372102	611229.470	137115.635	611229.470	137115.635	Required	Ý	
			©1982	-2019 Innovy	70			

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P.O. Box 161							
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6800 Netherlands							Mirro
Date 09/02/2022 11:45				gned by aga ked by	77500		Drainag
File 10029956-AUK-XX-XX	brainag						
XP Solutions			Netw	ork 2019.1			
		Man	hole Sched	dules for Fo	<u>oul - Main</u>		
	МН	Manhole	Manhole	Intersection	Intersection	Manhole	Lavout
	Name	Easting	Northing	Easting	Northing	Access	-
		(m)	(m)	(m)	(m)		
	TR11372103	611264.731	137156.425	611264.731	137156.425	Required	/
							, 🖉
	TR11372202	611225.959	137256.324	611225.959	137256.324	Required	. A Contraction of the contracti
	TD11070001	(11074 540	107006 004		107006 004		
	TR11372201	0112/4.540	13/220.924	0112/4.540	137226.924	Required	N
	TR11372203	611299.674	137212.212	611299.674	137212.212	Required	
							- 🥕
	TR11373201	611320.517	137252.672	611320.517	137252.672	Required	
							e e e e e e e e e e e e e e e e e e e
	TR11373301	611394.081	137315.814	611394.081	137315.814	Required	
							, 🖌
	TR11374301	611432 089	137356 274	611432 089	137356.274	Required	par 1
	11113/1301	011102.009	10/00.2/4	511452.009	10/00.2/4	nequired	4
							A POT
	TR11370501	611041.920	137556.090	611041.920	137556.090	Required	
							-
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P.O. Box 161							
AD Arnhem							
6800 Netherlands							Micro
Date 09/02/2022 11:45				gned by aga	7500		Drainage
File 10029956-AUK-XX-XX-	-M3-CW-0038-0	tterpool 1		ked by			brainage
XP Solutions			Netwo	ork 2019.1			
		Man	hole Sched	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
	TR11371501	611176.999	137511.773	611176.999	137511.773	Required	
	TR11372401	611288.793	137472.213	611288.793	137472.213	Required	
	TR11373401	611387.208	137456.570	611387.208	137456.570	Required	
	TR11376102	611610.726	137180.608	611610.726	137180.608	Required	
	TR11376101	611684.069	137160.416	611684.069	137160.416	Required	
	TR11377103	611768.106	137138.036	611768.106	137138.036	Required	
	TR11378102	611830.413	137132.249	611830.413	137132.249	Required	
	TR11379101	611918.454	137140.350	611918.454	137140.350	Required	
			@1982.	-2019 Innovy	70		





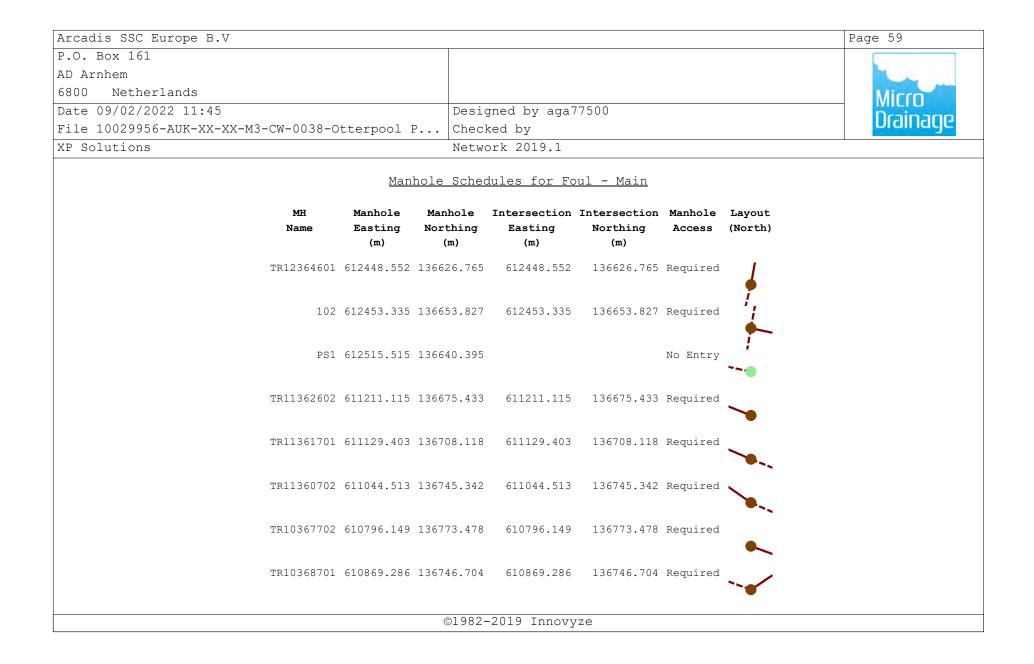
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P.O. Box 161						
AD Arnhem						
6800 Netherlands						Micro
Date 09/02/2022 11:45			gned by aga	77500		Drainage
File 10029956-AUK-XX-XX-M3-CW-0	038-Otterpool		ked by			brainage
XP Solutions		Netw	ork 2019.1			
	<u>Ma</u>	nhole Sche	dules for Fo	oul - Main		
M			Intersection Easting (m)	Intersection Northing (m)		Layout (North)
TR13:	373002 613307.80	9 137008.759	613307.809	137008.759	Required	
TR13:	373001 613301.87	1 137075.262	613301.871	137075.262	Required	
TR133	371101 613192.28	0 137100.937	613192.280	137100.937	Required	
TR13.	370101 613075.94	1 137123.831	613075.941	137123.831	Required	
TR12.	379101 612966.76	3 137152.167	612966.763	137152.167	Required	
TR123	378101 612852.37	1 137179.061	612852.371	137179.061	Required	
TR123	377201 612778.29	7 137201.830	612778.297	137201.830	Required	
TR123	377101 612726.18	9 137153.939	612726.189	137153.939	Required	
		©1982	-2019 Innovy	/ze		

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P.O. Box 161						
AD Arnhem						
6800 Netherlands			gned by aga			Micro
Date 09/02/2022 11:45	Drainage					
File 10029956-AUK-XX-XX-M3-CW-003	38-Otterpool		ked by			brainage
XP Solutions		Netw	ork 2019.1			
	Man	hole Sche	dules for Fo	oul - Main		
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		
TR1237	6101 612672.460	137104.558	612672.460	137104.558	Required	P ^{ret}
TR1237	6001 612645.370	137038.089	612645.370	137038.089	Required	\$
TR1236	6901 612613.119	136958.957	612613.119	136958.957	Required	
TR1236	5801 612569.071	136849.450	612569.071	136849.450	Required	
	100 612485.870	136821.920	612485.870	136821.920	Required	••••
	101 612467.517	136734.437	612467.517	136734.437	Required	
TR1336	1601 613133.613	136617.006	613133.613	136617.006	Required	1
TR1336	0501 613063.308	136545.572	613063.308	136545.572	Required	
		©1982	-2019 Innovy	/ze		7

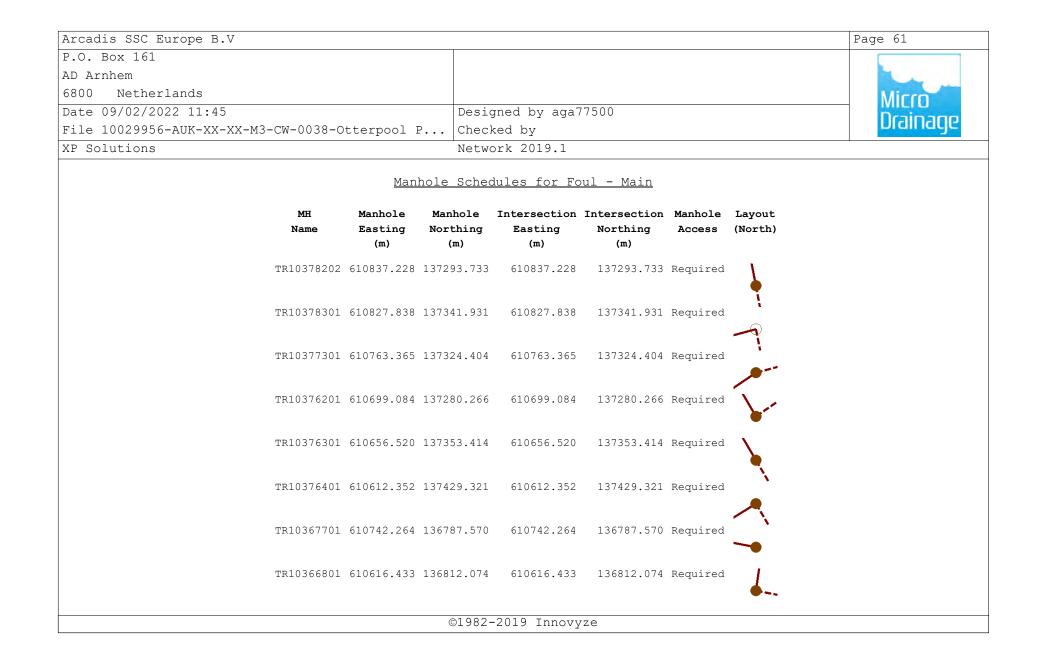
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P.O. Box 161								
AD Arnhem								The second
6800 Netherlands				ned by aga7				Micro
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XP Solutions			Networ	ck 2019.1				
		Manhole	Schedu	les for Fc	ul - Main			
м	I Manho	le Manh	nole I	Intersection	Intersection	Manhole	Lavout	
Nar				Easting	Northing	Access	-	
	(m)	(n	n)	(m)	(m)			
TR123	69401 613009	.190 13644	9.159	613009.190	136449.159	Required	. /	
TR123	69402 612924	.755 13649	5.208	612924.755	136495.208	Required		
	CO 401 C1 00 00	0.4.0 1.0.6.4.0	c 20 c	(10000 040	126406 206			
TRI23	68401 612839	.942 13649	6.386	612839.942	136496.386	Required		
							•	
TR123	67401 612749	.988 13651	0.274	612749.988	136510.274	Required		
TR123	66501 612641	.309 13653	2.495	612641.309	136532.495	Required		
TR123	65501 612525	.024 13654	0.506	612525.024	136540.506	Required		
						-	~	
mp.1.1.2	60202 611074	240 12624	0 161	611074 240	126240 161	Doguirod	,	
TRII3	09202 0119/4	.340 13024	0.101	0119/4.340	136240.161	vedutted		
							•	
TR123	60301 612035	.989 13632	4.827	612035.989	136324.827	Required		
							.	
		(C)	1982-2	2019 Innovy	ze			

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P.O. Box 161						
AD Arnhem						
6800 Netherlands						Micro
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File 10029956-AUK-XX-XX-M3-CW-0038	-Otterpool		ked by			brainage
XP Solutions		Netw	ork 2019.1			
	Man	hole Sche	dules for Fo	oul - Main		
МН	Manhole	Manhole	Intersection	Intersection	Manhole	Lavout
Name	Easting	Northing	Easting	Northing		-
	(m)	(m)	(m)	(m)		
TR123604	01 612105.590	136409.252	612105.590	136409.252	Required	
						, 🖉
TR123615	01 612165.080	136481.837	612165.080	136481.837	Required	
					- 1	
mp102006)2 612072.925	126626 154	(12072 025	136626.154	Decurimed	And the second
1R123000	02 012072.925	130020.134	012072.925	130020.134	Required	
TR1236150)2 612154.902	136597.400	612154.902	136597.400	Required	
						•
TR1236160	01 612174.479	136605.965	612174.479	136605.965	Required	
TR1236250	01 612206.291	136523.988	612206.291	136523.988	Required	$\sim \sqrt{2}$
						i de la companya de la
TR1236250)2 612258.818	136546.310	612258-818	136546.310	Required	A P
111230231		_00010.010	012200.010	100010.010		
m=100.000		100500 010	(10010 700	100500 010	Demi	
TR1236350	03 612312.739	136566.812	612312.739	136566.812	Kequired	
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P.O. Box 161						
AD Arnhem						
6800 Netherlands						Mirro
Date 09/02/2022 11:45		Desi	gned by aga	77500		Drainage
File 10029956-AUK-XX-XX-M3-CW-003	38-Otterpool	P Chec	ked by			Drainage
XP Solutions		Netw	ork 2019.1			
	Man	hole Sche	dules for Fo	oul - Main		
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
TR1236:	3504 612368.410	136575.988	612368.410	136575.988	Required	
TR1236:	2301 612273.944	136292.882	612273.944	136292.882	Required	
TR1236:	3301 612370.764	136336.654	612370.764	136336.654	Required	
TR1236.	3401 612333.254	136367.638	612333.254	136367.638	Required	
TR1236	3505 612377.835	136420.297	612377.835	136420.297	Required	
TR1236.	3501 612411.728	136461.272	612411.728	136461.272	Required	
TR1236	4501 612425.917	136522.764	612425.917	136522.764	Required	
TR1236	4502 612432.035	136560.082	612432.035	136560.082	Required	
		©1982	-2019 Innovy	/ze		<u> </u>



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P.O. Box 161						
AD Arnhem						
6800 Netherlands						Micro
Date 09/02/2022 11:45			gned by aga	77500		Drainage
File 10029956-AUK-XX-XX-M3-CW-00	38-Otterpool		ked by			brainage
XP Solutions		Netw	ork 2019.1			
	Mai	nhole Sche	dules for Fo	oul - Main		
MH Nam			Intersection Easting (m)	Intersection Northing (m)		-
TR1036	69701 610904.695	5 136770.764	610904.695	136770.764	Required	
TR1036	69802 610946.458	3 136814.798	610946.458	136814.798	Required	
TR1036	69801 610915.423	L 136864.279	610915.421	136864.279	Required	
TR1036	58901 610894.23 ⁻	7 136920.354	610894.237	136920.354	Required	
TR1034	68902 610881.153	3 136981.726	610881.153	136981.726	Required	
TR103*	78001 610873.676	6 137041.540	610873.676	137041.540	Required	
TR103	78101 610866.513	L 137101.977	610866.511	137101.977	Required	
TR103 ⁻	78201 610853.503	3 137204.221	610853.503	137204.221	Required	
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P.O. Box 161							9
AD Arnhem							
6800 Netherlands	Micro						
Date 09/02/2022 11:45				gned by aga	77500		Drainage
File 10029956-AUK-XX-XX-M	13-CW-0038-0	tterpool H		ked by			Drainideje
XP Solutions			Netw	ork 2019.1			
		Man	hole Sche	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	-
	TR10366901	610631.869	136920.471	610631.869		Required	
	TR10376001	610632.037	137022.622	610632.037	137022.622	Required	
	TR10375001	610537.913	137061.940	610537.913	137061.940	Required	
	TR10373201	610323.452	137220.998	610323.452	137220.998	Required	
	TR10374101	610404.470	137170.362	610404.470	137170.362	Required	
	TR10374001	610478.683	137096.334	610478.683	137096.334	Required	\sim
	TR10375101	610506.129	137164.597	610506.129	137164.597	Required	
	TR10375201	610501.203	137239.193	610501.203	137239.193	Required	
			©1982	-2019 Innovy	7Ze		1

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P.O. Box 161								
AD Arnhem								
6800 Netherlands							Micro	
Date 09/02/2022 11:4	5		Desi	gned by aga	77500		Draina	ao
File 10029956-AUK-XX	Dialita	Чe						
XP Solutions			Netw	ork 2019.1				
		Man	hole Sche	dules for Fo	oul - Main			
						M h - h -	•	
	MH Name	Manhole Easting	Mannole Northing	Intersection Easting	Northing	Mannole Access	-	
		(m)	(m)	(m)	(m)		(
	TR10374301	610485 017	137310 975	610485.017	137310 975	Required	I	
	11(10574501	010403.017	10/010.0/0	010403.017	13/310.9/3	nequirea		
							. 1	
	TR10374302	610496.534	137356.631	610496.534	137356.631	Required		
							P	
	TR10374401	610439.268	137413.765	610439.268	137413.765	Required	\mathbf{X}	
	TR10373401	610378.930	137473.963	610378.930	137473.963	Required	× *	
	TR10373501	610314 567	1375/1 520	610314 567	137541.529	Poquirod	N	
	1K105/5501	010314.30/	13/341.329	010314.307	137341.329	Required	-	
	TR10372501	610251.216	137561.305	610251.216	137561.305	Required	$\mathbf{\lambda}$	
							.	
	TR10372601	610226.040	137601.448	610226.040	137601.448	Required		
	TR10371502	610126.196	137587.470	610126.196	137587.470	Required	Ň	
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				0.01.0 -			-	
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P.O. Box 161							
AD Arnhem							
6800 Netherlands							Micro
Date 09/02/2022 11:45			Des	signed by aga	7500		Drainage
File 10029956-AUK-XX-XX-M3-C	W-0038-0	tterpool A	P Che	ecked by			Drainage
XP Solutions			Net	work 2019.1			·
		Man	hole Sch	nedules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	e Intersection g Easting (m)	Intersection Northing (m)	Manhole Access	-
T	R10370501	610048.317	137562.1	610048.317	137562.176	Required	
Т	R09379501	609986.255	137551.0	60 609986.255	137551.060	Required	
Т	R10356901	610697.085	135952.64	41 610697.085	135952.641	Required	
Т	R10366001	610648.795	136077.08	610648.795	136077.081	Required	
Т	R10366101	610632.004	136197.64	48 610632.004	136197.648	Required	
T	R10366301	610617.531	136301.5	77 610617.531	136301.577	Required	
Т	R10365401	610581.867	136428.23	610581.867	136428.211	Required	
Т	R10365501	610579.465	136560.82	610579.465	136560.824	Required	
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P.O. Box 161							
AD Arnhem							
6800 Netherlands				gned by aga			Micro
Date 09/02/2022 11:45	Drainage						
File 10029956-AUK-XX-XX-M3-	-CW-0038-0	tterpool 1		ked by			brainage
XP Solutions			Netwo	ork 2019.1			
		Man	hole Sched	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	
	TR10365601	610589.171	136674.793	610589.171	136674.793	Required	
	TR10364601	610477.980	136675.497	610477.980	136675.497	Required	!
	TR10363601	610383.678	136646.643	610383.678	136646.643	Required	
	TR10363501	610304.156	136583.306	610304.156	136583.306	Required	
	TR10354901	610455.821	135967.020	610455.821	135967.020	Required	
	TR10364001	610423.390	136035.935	610423.390	136035.935	Required	
	TR10363101	610399.067	136101.472	610399.067	136101.472	Required	
	TR10363102	610389.608	136135.632	610389.608	136135.632	Required	
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AD Arnhem							
6800 Netherlands	Micro						
Date 09/02/2022 11:45	Drainage						
File 10029956-AUK-XX-XX-M	Drainage						
XP Solutions			Netwo	ork 2019.1			
		Man	hole Schee	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
	TR10364101	610424.742	136192.008	610424.742	136192.008	Required	4
	TR10364201	610440.281	136233.222	610440.281	136233.222	Required	
	TR10364202	610434.200	136287.949	610434.200	136287.949	Required	
	TR10364301	610406.198	136332.071	610406.198	136332.071	Required	
	TR10363301	610318.230	136324.330	610318.230	136324.330	Required	
	TR10362401	610256.301	136422.150	610256.301	136422.150	Required	
	TR10362501	610200.002	136503.784	610200.002	136503.784	Required	1 have been a second se
	TR10361501	610132.548	136581.833	610132.548	136581.833	Required	
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P.O. Box 161							
AD Arnhem							
6800 Netherlands							Micro
Date 09/02/2022 11:45				gned by aga	77500		Drainage
File 10029956-AUK-XX-XX-M	3-CW-0038-0	tterpool 1		ked by			brainage
XP Solutions			Netw	ork 2019.1			
		Man	hole Sche	dules for Fo	oul - Main		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
	TR10360501	610014.918	136561.491	610014.918	136561.491	Required	N
	TR09369601	609936.172	136606.914	609936.172	136606.914	Required	
	TR09368601	609892.915	136674.620	609892.915	136674.620	Required	
	TR09368702	609849.098	136771.498	609849.098	136771.498	Required	
	TR09368801	609836.628	136814.161	609836.628	136814.161	Required	
	TR09368901	609862.225	136933.615	609862.225	136933.615	Required	4
	TR09378001	609887.823	137056.352	609887.823	137056.352	Required	4
	TR10372201	610232.902	137218.019	610232.902	137218.019	Required	; /
			©1982	-2019 Innovy	/ze		

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P.O. Box 161							
AD Arnhem							
6800 Netherlands	Micro						
Date 09/02/2022 11:45	Drainage						
File 10029956-AUK-XX-XX	Drainage						
XP Solutions			Netw	ork 2019.1			
		Man	hole Schee	dules for Fo	<u>oul - Main</u>		
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
	TR10371102	610156.649	137167.383	610156.649	137167.383	Required	• • • • • • • • • • • • • • • • • • •
	TR10360901	610088.141	136938.029	610088.141	136938.029	Required	
	TR10371001	610107.031	137017.856	610107.031	137017.856	Required	
	TR10371101	610129.842	137104.832	610129.842	137104.832	Required	
	TR10370101	610072.229	137122.468	610072.229	137122.468	Required	
	TR10370102	610006.060	137144.074	610006.060	137144.074	Required	
	TR09379101	609944.618	137160.954	609944.618	137160.954	Required	
	TR09379103	609912.107	137171.868	609912.107	137171.868	Required	<i>b</i>
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AD Arnhem						
6800 Netherlands						Micro
Date 09/02/2022 11:45			gned by aga	77500		Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-	-Otterpool	P Chec	ked by			Drainage
XP Solutions		Netw	ork 2019.1			
	Man	hole Sche	dules for Fo	oul - Main		
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)		Layout (North)
TR0937920	01 609936.216	137293.025	609936.216	137293.025	Required	4
TR0937930	01 609947.263	137356.778	609947.263	137356.778	Required	
TR0937940	01 609940.822	137419.607	609940.822	137419.607	Required	
TR0937950	03 609954.493	137513.028	609954.493	137513.028	Required	
TR0937950	02 609942.539	137546.157			No Entry	
TR0937860	01 609880.000	137591.000	609880.000	137591.000	Required	
TR0937760	02 609797.000	137635.000	609797.000	137635.000	Required	
TR0937760	01 609748.000	137670.000	609748.000	137670.000	Required	
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AD Arnhem							and the second second
6800 Netherlands							Micro
Date 09/02/2022 11:45		Desi	gned by aga	77500			Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-	Otterpool 1	P Chec	ked by				Diamage
XP Solutions		Netw	ork 2019.1				L
	Man	hole Schee	dules for Fo	oul - Main			
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access		
TR09376601	609669.000	137717.000	609669.000	137717.000	Required	-	
TR09375602	609596.000	137738.000	609596.000	137738.000	Required		
Onsite_WwTV	609595.000	137749.000			No Entry		
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AD Arnhem				
6800 Netherlands		Micro		
Date 09/02/2022 11:45	Designed by aga77500			
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage		
XP Solutions	Network 2019.1	1		

<u>Upstream Manhole</u>

Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
0	150	TR11350901	101.260	99.910	1.200	Open Manhole	1200
0	150	TR11351901	100.830	99.062	1.618	Open Manhole	1200
0	225	TR11352801	99.860	98.132	1.503	Open Manhole	1200
0	225	TR11353801	98.950	97.525	1.200	Open Manhole	1200
0	150	TR11354402	105.500	104.150	1.200	Open Manhole	1200
0	150	TR11354401	104.840	103.490	1.200	Open Manhole	1200
0	150	TR11354601	103.210	101.860	1.200	Open Manhole	1200
	Sect 0 0 0 0	 150 225 225 150 150 150 	Sect (mm) Name 0 150 TR11350901 0 150 TR11351901 0 225 TR11352801 0 225 TR11353801 0 150 TR11354402 0 150 TR11354402 0 150 TR11354401	Sect (mm) Name (m) 0 150 TR11350901 101.260 0 150 TR11351901 100.830 0 225 TR11352801 99.860 0 225 TR11353801 98.950 0 150 TR11354402 105.500 0 150 TR11354401 104.840	Sect (mm) Name (m) (m) 0 150 TR11350901 101.260 99.910 0 150 TR11351901 100.830 99.062 0 225 TR11352801 99.860 98.132 0 225 TR11353801 98.950 97.525 0 150 TR11354402 105.500 104.150 0 150 TR11354401 104.840 103.490	Sect (mm) Name (m) (m) (m) 0 150 TR11350901 101.260 99.910 1.200 0 150 TR11351901 100.830 99.062 1.618 0 225 TR11352801 99.860 98.132 1.503 0 225 TR11353801 98.950 97.525 1.200 0 150 TR11354402 105.500 104.150 1.200 0 150 TR11354401 104.840 103.490 1.200	Sect (mm) Name (m) (m) (m) Connection 0 150 TR11350901 101.260 99.910 1.200 Open Manhole 0 150 TR11351901 100.830 99.062 1.618 Open Manhole 0 225 TR11352801 99.860 98.132 1.503 Open Manhole 0 225 TR11353801 98.950 97.525 1.200 Open Manhole 0 150 TR11354402 105.500 104.150 1.200 Open Manhole 0 150 TR11354401 104.840 103.490 1.200 Open Manhole

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
1.000	113.598	133.9	TR11351901	100.830	99.062	1.618	Open Manhole	1200
1.001	124.454	133.9	TR11352801	99.860	98.132	1.578	Open Manhole	1200
1.002	94.357	155.4	TR11353801	98.950	97.525	1.200	Open Manhole	1200
1.003	114.055	232.3	TR11354801	98.600	97.034	1.341	Junction	
2.000	53.676	81.3	TR11354401	104.840	103.490	1.200	Open Manhole	1200
2.001	134.096	82.3	TR11354601	103.210	101.860	1.200	Open Manhole	1200
2.002	138.806	60.9	TR11355701	100.930	99.580	1.200	Open Manhole	1200

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P.O. Box 161		
AD Arnhem		Contraction of the second
6800 Netherlands		Micro
Date 09/02/2022 11:45	Designed by aga77500	Drainage
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Diamage
XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
2.003	0	150	TR11355701	100.930	99.580	1.200	Open Manhole	1200
1.004	0	225	TR11354801	98.600	97.034	1.341	Junction	
1.005	0	225	TR11356801	97.610	96.185	1.200	Open Manhole	1200
1.006	0	225	TR11356802	94.520	93.095	1.200	Open Manhole	1200
1.007	0	225	TR11357902	88.500	87.075	1.200	Open Manhole	1200
1.008	0	300	TR11368001	80.530	79.030	1.200	Open Manhole	1200
1.009	0	300	TR11367001	81.550	78.761	2.489	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
2.003	130.667	51.3	TR11354801	98.600	97.034	1.416	Junction	
1.004	119.687	141.0	TR11356801	97.610	96.185	1.200	Open Manhole	1200
1.005	87.665	28.4	TR11356802	94.520	93.095	1.200	Open Manhole	1200
1.006	87.953	14.6	TR11357902	88.500	87.075	1.200	Open Manhole	1200
1.007	110.886	13.8	TR11368001	80.530	79.030	1.275	Open Manhole	1200
1.008	89.900	334.7	TR11367001	81.550	78.761	2.489	Open Manhole	1200
1.009	131.095	334.7	TR11366101	86.210	78.370	7.540	Open Manhole	1200

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P.O. Box 161		
AD Arnhem		Contraction of the second
6800 Netherlands		Micro
Date 09/02/2022 11:45	Designed by aga77500	
File 10029956-AUK-XX-XX-M3-CW-0038-Otterpool P	Checked by	Drainage
XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
1.010	0	300	TR11366101	86.210	78.370	7.540	Open Manhole	1200
1.011	0	300	TR11366201	80.890	78.152	2.438	Open Manhole	1200
1.012	0	300	TR11366303	78.260	76.760	1.200	Open Manhole	1200
1.013	0	300	TR11367301	75.670	74.170	1.200	Open Manhole	1200
3.000	0	150	TR11369101	74.950	73.600	1.200	Open Manhole	1200
3.001	0	150	TR11369201	76.800	73.006	3.644	Open Manhole	1200
3.002	0	150	TR11369203	75.740	72.212	3.378	Open Manhole	1200

Downstream Manhole

	PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
		(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
1	L.010	72.895	334.7	TR11366201	80.890	78.152	2.438	Open Manhole	1200
1	L.011	99.800	71.7	TR11366303	78.260	76.760	1.200	Open Manhole	1200
1	L.012	64.871	25.0	TR11367301	75.670	74.170	1.200	Open Manhole	1200
1	L.013	122.542	82.2	TR11368301	74.180	72.680	1.200	Junction	
3	3.000	79.530	133.9	TR11369201	76.800	73.006	3.644	Open Manhole	1200
З	3.001	106.302	133.9	TR11369203	75.740	72.212	3.378	Open Manhole	1200
Э	3.002	90.026	133.9	TR11368301	74.180	71.540	2.490	Junction	

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P.O. Box 161										
AD Arnhem										and the second
6800 Netherlands										Micro
Date 09/02/2022 11:45					Design	ed by a	ga77500			Drainage
File 10029956-AUK-XX-XX-M3-0	CW-C	038-0	Otter	pool P	Checke	d by				Diamage
XP Solutions					Networ	k 2019.	1			
				<u>PIPELINE</u>	SCHEDU	JLES for	Foul -	- <u>Main</u>		
					<u>Upstre</u>	eam Manh	ole			
F	PN	Hyd	Diam	мн с	Level 1	[.Level D	.Depth	МН М	H DIAM., L*W	
		Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)	
1	014	0	300 т	R11368301	74 180	71 540	2.340	Junction		
	015)pen Manhole	1200	
1.	016	0	300 I	R11368501	73.480	71.009	2.171 0)pen Manhole	1200	
4.	000	0	150 т	R11368702	70.070	68.720	1.200 0)pen Manhole	1200	
	001)pen Manhole	1200	
					Downstr	ream Man	hole			
PN	-	anath	Slope	МН	C I arral	I.Level	D. Donth	MH	MH DIAM., L*W	
PN PN	Ц	(m)	(1:X)		(m)	(m)	(m)	Connection	(mm)	
1.01	4 7	74.942	334.2	TR11368401	73.410	71.316	1.794	Open Manhole	1200	
				TR11368501				Open Manhole		
1.01	6 11	15.311	91.6	TR11368601	71.250	69.750	1.200	Junction		
4.00	0 7	77.718	133.9	TR11368701	70.160	68.140	1.870	Open Manhole	1200	
				TR11368601				-		
				(D1982-2	019 Inn	ovyze			

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AD Arnhem										10 C
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File 10029956-AUK-XX-XX-M3-	-CW-C	038-0	Otter	pool P	-		,			Dra
XP Solutions	0 0		00001			ck 2019.1	1			
				PIPELINE	SCHED	ULES for	Foul -	- <u>Main</u>		
					<u>Upstre</u>	eam Manh	ole			
	PN	Hyd	Diam	MH (C.Level	I.Level D	.Depth	MH M	H DIAM., L*W	
		Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)	
1	.017	0	300 I	R11368601	71.250	67.610	3.340	Junction		
	.018				71.070			Open Manhole	1200	
5	.000	0	150 T	R11366701	71.990	70.640	1.200 0	Open Manhole	1200	
1	.019	0	300 I	R11366601	71.320	67.273	3.747	Junction		
1	.020							Open Manhole	1200	
1	.021	0	300 I	R11365702	70.920	66.630	3.990 0	Open Manhole	1200	
					Downst	ream Man	<u>hole</u>			
PN	N L	ength (m)	Slope (1:X)		C.Leve (m)	l I.Level (m)	D.Depth (m)	n MH Connection	MH DIAM., L*W (mm)	
1 0	17 /	11 752	331 0	TR11367602	2 71 07	0 67.485	3 295	o Open Manhole	1200	
				TR11367602				-		
5.0	00 7	71.411	87.1	TR11366601	L 71.32	69.820	1.350) Junction		
1.0	19 14	15.417	334.2	TR11365601	72.54	0 66.838	5.402	2 Open Manhole	1200	
1.02				TR11365702) Open Manhole		
				TR11365701				-		

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File 10029956-AUK-XX-XX-	МЗ-СМ-	-0038-0	Otterp	pool P	Checke	ed by				Drainage
XP Solutions					Networ	ck 2019.	1			
				PIPELINE	SCHED	ULES for	<u>r Foul -</u>	- <u>Main</u>		
					<u>Upstr</u>	eam Manl	<u>nole</u>			
	PN	Hyd	Diam	мн с	Level	I.Level I).Depth	мн м	H DIAM., L*W	
		Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)	
	c		150 -	-11066700			1 000		1000	
	6.000 6.001			R11366702 R11366703	72.330			Open Manhole Open Manhole	1200 1200	
	0.001		100 1	1111000700	11.070	09.720	1.200 0	open namere	1200	
	1.022	2 0	300 T	R11365701	66.830	65.330	1.200	Junction		
	7.000) 0	150 т	R11366901	70.520	69.170	1.200 0	Open Manhole	1200	
	7.001							Open Manhole	1200	
					Downst.	ream Mai	nhole			
	PN	Length	Slope	MH	C.Leve	l I.Level	L D.Depth	n MH	MH DIAM., L*W	
		(m)	(1:X)		(m)	(m)	(m)	Connection	(mm)	
	6.000	64.047	50.8	TR11366703	71.07	0 69.720) 1.200) Open Manhole	1200	
				TR11365701						
	1.022 1	L09.460	295.8	TR11364902	66.46	0 64.960	1.200) Junction		
	7.000	57.723	62.7	TR11365903	69.60	0 68.250) 1.200) Open Manhole	1200	
				TR11365902) Open Manhole		
				(D1982-2	2019 Inn	ovyze			

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XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
7.002	0	150	TR11365902	68.470	67.120	1.200	Open Manhole	1200
1.023	0	300	TR11364902	66.460	64.960	1.200	Junction	
1.024	0	300	TR11364801	67.320	64.864	2.156	Open Manhole	1200
1.025	0	300	TR11364901	67.270	64.737	2.233	Open Manhole	1200
1.026	0	300	TR11363901	67.980	64.576	3.104	Open Manhole	1200
1.027	0	300	TR11363902	66.960	64.321	2.339	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.002	44.046	20.4	TR11364902	66.460	64.960	1.350	Junction	
1.024 1.025	37.720 47.528	295.8 295.8	TR11364801 TR11364901 TR11363901 TR11363902		64.864 64.737 64.576 64.321	2.233 3.104	Open Manhole Open Manhole Open Manhole Open Manhole	1200 1200 1200 1200
1.027	40.088	295.8	TR11362902	66.820	64.186	2.334	Junction	

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XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
8.000	0	150	TR11364701	68.370	67.020	1.200	Open Manhole	1200
8.001	0	150	TR11363802	70.070	66.365	3.555	Open Manhole	1200
8.002	0	150	TR11363801	70.320	65.733	4.437	Open Manhole	1200
9.000	0	150	TR11361801	69.610	68.260	1.200	Open Manhole	1200
8.003	0	150	TR11362801	69.160	65.275	3.735	Junction	

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
8.000	87.763	133.9	TR11363802	70.070	66.365	3.555	Open Manhole	1200
8.001	84.538	133.9	TR11363801	70.320	65.733	4.437	Open Manhole	1200
8.002	61.315	133.9	TR11362801	69.160	65.275	3.735	Junction	
9.000	124.443	133.9	TR11362801	69.160	67.331	1.679	Junction	
8.003	137.286	133.9	TR11362902	66.820	64.250	2.420	Junction	

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XP Solutions	Network 2019.1	1

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
10.000	0	150	TR11360802	67.910	66.560	1.200	Open Manhole	1200
10.001	0	150	TR11361901	66.390	65.040	1.200	Open Manhole	1200
10.002	0	150	TR11361902	64.735	63.385	1.200	Open Manhole	1200
10.003	0	150	TR11362901	66.580	63.018	3.412	Open Manhole	1200
1.028	0	375	TR11362902	66.820	62.664	3.781	Junction	
1.029	0	375	TR11373001	67.380	62.416	4.589	Open Manhole	1350
1.030	0	375	TR11372002	65.840	62.228	3.237	Open Manhole	1350

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
10.000	66.490	43.7	TR11361901	66.390	65.040	1.200	Open Manhole	1200
10.001	56.063	33.9	TR11361902	64.735	63.385	1.200	Open Manhole	1200
10.002	49.862	135.8	TR11362901	66.580	63.018	3.412	Open Manhole	1200
10.003	48.084	135.8	TR11362902	66.820	62.664	4.006	Junction	
1.028	112.383	453.1	TR11373001	67.380	62.416	4.589	Open Manhole	1350
1.029	85.263	453.1	TR11372002	65.840	62.228	3.237	Open Manhole	1350
1.030	26.763	453.1	TR11372102	66.720	62.168	4.177	Open Manhole	1350

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
1.031	0	375	TR11372102	66.720	62.168	4.177	Open Manhole	1350
1.032	0	375	TR11372103	68.490	62.049	6.066	Open Manhole	1350
11.000	0	150	TR11372202	64.900	63.550	1.200	Open Manhole	1200
11.001	0	150	TR11372201	65.090	63.126		Open Manhole	1200
1.033	0	375	TR11372203	67.730	61.904	5 4 5 1	Open Manhole	1350
1.034	0		TR11373201	66.200	61.804		Open Manhole	1350

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
1.031	53.918	453.1	TR11372103	68.490	62.049	6.066	Open Manhole	1350
1.032	65.827	453.1	TR11372203	67.730	61.904	5.451	Open Manhole	1350
11 000	56 784	133 9	TR11372201	65.090	63.126	1 814	Open Manhole	1200
			TR11372203				Open Manhole	1350
1 000	45 510	450 1			61 004	4 001		1050
			TR11373201 TR11373301	66.200 65.970	61.804 61.590		Open Manhole Open Manhole	1350 1350
1.004	J0.J40	400.1	11(11)/001	03.970	01.550	4.005	open Mannore	1000

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XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
1.035	0	375	TR11373301	65.970	61.590	4.005	Open Manhole	1350
1.036	0	375	TR11374301	65.940	61.467	4.098	Open Manhole	1350
12.000	0	150	TR11370501	64.209	62.859	1.200	Open Manhole	1200
12.001	0	150	TR11371501	66.199	61.797	4.252	Open Manhole	1200
12.002	0	150	TR11372401	64.799	60.912	3.737	Open Manhole	1200
12.003	0	150	TR11373401	62.320	60.167	2.003	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
1.035	55.512	453.1	TR11374301	65.940	61.467	4.098	Open Manhole	1350
1.036	92.646	453.1	TR11374401	65.280	61.263	3.642	Open Manhole	1350
12 000	1/12 163	133 0	TR11371501	66.199	61.797	1 252	Open Manhole	1200
			TR11372401	64.799	60.912		Open Manhole	1200
12.002	99.651	133.9	TR11373401	62.320	60.167	2.003	Open Manhole	1200
12.003	91.067	133.9	TR11374401	65.280	59.487	5.643	Open Manhole	1350

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XP Solutions	Network 2019.1	1

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
13.000	0	150	TR11376102	69.790	68.440	1.200	Open Manhole	1200
13.001	0	150	TR11376101	69.650	67.872	1.628	Open Manhole	1200
13.002	0	150	TR11377103	70.070	67.222	2.698	Open Manhole	1200
13.003	0	150	TR11378102	70.490	66.755	3.585	Open Manhole	1200
13.004	0	150	TR11379101	71.030	66.095	4.785	Open Manhole	1200
13.005	0	150	TR11379102	71.730	65.758	5.822	Open Manhole	1200
13.006	0	150	TR11379201	72.790	65.148	7.492	Open Manhole	1200
13.007	0	150	TR11378201	72.290	64.463	7.677	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
13.000	76.072	133.9	TR11376101	69.650	67.872	1.628	Open Manhole	1200
13.001	86.966	133.9	TR11377103	70.070	67.222	2.698	Open Manhole	1200
13.002	62.575	133.9	TR11378102	70.490	66.755	3.585	Open Manhole	1200
13.003	88.413	133.9	TR11379101	71.030	66.095	4.785	Open Manhole	1200
13.004	45.122	133.9	TR11379102	71.730	65.758	5.822	Open Manhole	1200
13.005	81.662	133.9	TR11379201	72.790	65.148	7.492	Open Manhole	1200
13.006	91.733	133.9	TR11378201	72.290	64.463	7.677	Open Manhole	1200
13.007	46.713	133.9	TR11378301	72.550	64.114	8.286	Open Manhole	1200

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XP Solutions	Network 2019.1							

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
13.008	0	150	TR11378301	72.550	64.114	8.286	Open Manhole	1200
13.009	0	150	TR11377301	69.130	63.161	5.819	Open Manhole	1200
13.010	0	150	TR11377302	67.550	62.833	4.567	Open Manhole	1200
13.011	0	150	TR11376301	66.540	62.355	4.035	Open Manhole	1200
13.012	0	150	TR11375401	65.940	61.500	4.290	Open Manhole	1200
1.037	0	450	TR11374401	65.280	59.487	5.343	Open Manhole	1350

Downstream Manhole

PN	Length	-	MH			D.Depth		MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
13.008	127.588	133.9	TR11377301	69.130	63.161	5.819	Open Manhole	1200
13.009	43.900	133.9	TR11377302	67.550	62.833	4.567	Open Manhole	1200
13.010	64.004	133.9	TR11376301	66.540	62.355	4.035	Open Manhole	1200
13.011	114.546	133.9	TR11375401	65.940	61.500	4.290	Open Manhole	1200
13.012	57.907	133.9	TR11374401	65.280	61.067	4.063	Open Manhole	1350
1.037	10.364	500.0	PS2	65.529	59.467	5.612	Open Manhole	0

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XP Solutions	Network 2019.1	1					

<u>Upstream Manhole</u>

Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
0	150	TR13365801	80.700	79.350	1.200	Open Manhole	1200
0	150	TR13361602	84.890	83.540	1.200	Open Manhole	1200
0	150	TR13363701	82.390	81.040	1.200	Open Manhole	1200
0	150	TR13364802	79.920	78.364	1.406	Junction	
0	150	TR13363801	79.990	77.673	2.167	Open Manhole	1200
0	150	TR13363901	79.060	77.062	1.848	Open Manhole	1200
	Sect 0 0 0 0 0 0	 o 150 o 150 o 150 o 150 o 150 	Sect (mm) Name o 150 TR13365801 o 150 TR13361602 o 150 TR13363701 o 150 TR13364802 o 150 TR13363801	Sect (mm) Name (m) 0 150 TR13365801 80.700 0 150 TR13361602 84.890 0 150 TR13363701 82.390 0 150 TR13364802 79.920 0 150 TR13363801 79.990	Sect (mm) Name (m) (m) o 150 TR13365801 80.700 79.350 o 150 TR13361602 84.890 83.540 o 150 TR13363701 82.390 81.040 o 150 TR13364802 79.920 78.364 o 150 TR13363801 79.990 77.673	Sect (mm) Name (m) (m) (m) 0 150 TR13365801 80.700 79.350 1.200 0 150 TR13361602 84.890 83.540 1.200 0 150 TR13363701 82.390 81.040 1.200 0 150 TR13364802 79.920 78.364 1.406 0 150 TR13363801 79.990 77.673 2.167	Sect (mm) Name (m) (m) (m) Connection 0 150 TR13365801 80.700 79.350 1.200 Open Manhole 0 150 TR13361602 84.890 83.540 1.200 Open Manhole 0 150 TR13363701 82.390 81.040 1.200 Open Manhole 0 150 TR13364802 79.920 78.364 1.406 Junction 0 150 TR13363801 79.990 77.673 2.167 Open Manhole

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
14.000	132.014	133.9	TR13364802	79.920	78.364	1.406	Junction	
	130.976 114.840		TR13363701 TR13364802	82.390 79.920	81.040 78.570	1.200 1.200	Open Manhole Junction	1200
14.001	93.223	134.8	TR13363801	79.990	77.673	2.167	Open Manhole	1200
14.002	82.358	134.8	TR13363901	79.060	77.062	1.848	Open Manhole	1200
14.003	60.724	79.7	TR13373002	77.650	76.300	1.200	Open Manhole	1200

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XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
14.004	0	150	TR13373002	77,650	76.300	1 200	Open Manhole	1200
14.004	0		TR13373002	78.040	75.802		Open Manhole	1200
14.006	0	225	TR13371101	79.750	75.318		Open Manhole	1200
14.007	0	225	TR13370101	81.460	74.809	6.426	Open Manhole	1200
14.008	0	225	TR12379101	78.945	74.324	4.396	Open Manhole	1200
14.009	0	225	TR12378101	75.860	73.819	1.816	Open Manhole	1200
14.010	0	225	TR12377201	75.580	73.486	1.869	Open Manhole	1200
14.011	0	225	TR12377101	75.790	73.181	2.384	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
14.004	66.768	134.1	TR13373001	78.040	75.802	2.088	Open Manhole	1200
14.005	112.558	232.6	TR13371101	79.750	75.318	4.207	Open Manhole	1200
14.006	118.570	232.6	TR13370101	81.460	74.809	6.426	Open Manhole	1200
14.007	112.795	232.6	TR12379101	78.945	74.324	4.396	Open Manhole	1200
14.008	117.511	232.6	TR12378101	75.860	73.819	1.816	Open Manhole	1200
14.009	77.495	232.6	TR12377201	75.580	73.486	1.869	Open Manhole	1200
14.010	70.773	232.6	TR12377101	75.790	73.181	2.384	Open Manhole	1200
14.011	72.974	232.6	TR12376101	75.420	72.868	2.327	Open Manhole	1200

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
14.012	0	225	TR12376101	75.420	72.868	2.327	Open Manhole	1200
14.013	0	225	TR12376001	74.110	72.553	1.332	Open Manhole	1200
14.014	0	225	TR12366901	72.180	70.755	1.200	Open Manhole	1200
14.015	0	225	TR12365801	71.090	69.665	1.200	Open Manhole	1200
14.016	0	300	100	70.500	69.000	1.200	Open Manhole	1200
14.017	0	375	101	71.400	68.733	2.292	Open Manhole	1350
16.000	0	150	TR13361601	88.650	87.300	1.200	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
4.012	71.777	228.0	TR12376001	74.110	72.553	1.332	Open Manhole	1200
4.013	85.452	47.5	TR12366901	72.180	70.755	1.200	Open Manhole	1200
4.014	118.034	108.3	TR12365801	71.090	69.665	1.200	Open Manhole	1200
4.015	87.637	131.8	100	70.500	69.000	1.275	Open Manhole	1200
4.016	89.387	334.7	101	71.400	68.733	2.367	Open Manhole	1350
4.017	81.848	453.1	102	72.700	68.552	3.773	Open Manhole	1350
6.000	100.227	133.9	TR13360501	90.730	86.551	4.029	Open Manhole	1200
	4.012 4.013 4.014 4.015 4.016 4.017	(m) 4.012 71.777 4.013 85.452 4.014 118.034 4.015 87.637 4.016 89.387 4.017 81.848	(m) (1:X) 4.012 71.777 228.0 4.013 85.452 47.5 4.014 118.034 108.3 4.015 87.637 131.8 4.016 89.387 334.7 4.017 81.848 453.1	(m) (1:X) Name 4.012 71.777 228.0 TR12376001 4.013 85.452 47.5 TR12366901 4.014 118.034 108.3 TR12365801 4.015 87.637 131.8 100 4.016 89.387 334.7 101 4.017 81.848 453.1 102	(m)(1:X)Name(m)4.01271.777228.0TR1237600174.1104.01385.45247.5TR1236690172.1804.014118.034108.3TR1236580171.0904.01587.637131.810070.5004.01689.387334.710171.4004.01781.848453.110272.700	(m) (1:X) Name (m) (m) 4.012 71.777 228.0 TR12376001 74.110 72.553 4.013 85.452 47.5 TR12366901 72.180 70.755 4.014 118.034 108.3 TR12365801 71.090 69.665 4.015 87.637 131.8 100 70.500 69.000 4.016 89.387 334.7 101 71.400 68.733 4.017 81.848 453.1 102 72.700 68.552	(m)(1:X)Name(m)(m)(m)4.01271.777228.0TR1237600174.11072.5531.3324.01385.45247.5TR1236690172.18070.7551.2004.014118.034108.3TR1236580171.09069.6651.2004.01587.637131.810070.50069.0001.2754.01689.387334.710171.40068.7332.3674.01781.848453.110272.70068.5523.773	(m)(1:X)Name(m)(m)(m)Connection4.01271.777228.0TR1237600174.11072.5531.332Open Manhole4.01385.45247.5TR1236690172.18070.7551.200Open Manhole4.014118.034108.3TR1236580171.09069.6651.200Open Manhole4.01587.637131.810070.50069.0001.275Open Manhole4.01689.387334.710171.40068.7332.367Open Manhole4.01781.848453.110272.70068.5523.773Open Manhole

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
16.001	0	150	TR13360501	90.730	86.551	4.029	Open Manhole	1200
16.002	0	150	TR12369401	87.920	85.726	2.044	Open Manhole	1200
16.003	0	150	TR12369402	85.790	84.440	1.200	Open Manhole	1200
16.004	0	150	TR12368401	81.360	80.010	1.200	Open Manhole	1200
16.005	0	150	TR12367401	79.870	78.520	1.200	Open Manhole	1200
16.006	0	150	TR12366501	76.260	74.910	1.200	Open Manhole	1200
16.007	0	150	TR12365501	75.780	74.043	1.587	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
16.001	110.563	133.9	TR12369401	87.920	85.726	2.044	Open Manhole	1200
16.002	96.176	74.8	TR12369402	85.790	84.440	1.200	Open Manhole	1200
16.003	84.821	19.1	TR12368401	81.360	80.010	1.200	Open Manhole	1200
16.004	91.020	61.1	TR12367401	79.870	78.520	1.200	Open Manhole	1200
16.005	110.928	30.7	TR12366501	76.260	74.910	1.200	Open Manhole	1200
16.006	116.560	134.5	TR12365501	75.780	74.043	1.587	Open Manhole	1200
16.007	95.027	134.5	TR12364502	74.870	73.336	1.384	Junction	

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
17.000	0	150	TR11369202	77.240	75.890	1,200	Open Manhole	1200
17.001	0		TR12360301	78.940	75.108		Open Manhole	1200
17.002	0	150	TR12360401	78.340	74.291	3.899	Open Manhole	1200
17.003	0	150	TR12361501	77.890	73.590	4.150	Open Manhole	1200
18.000	0	150	TR12360602	75.970	74.620	1.200	Open Manhole	1200
18.001	0	150	TR12361502	75.080	73.730	1.200	Open Manhole	1200
18.002	0	150	TR12361601	74.870	73.520	1.200	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
17.000	104.733	133.9	TR12360301	78.940	75.108	3.682	Open Manhole	1200
17.001	109.416	133.9	TR12360401	78.340	74.291	3.899	Open Manhole	1200
17.002	93.850	133.9	TR12361501	77.890	73.590	4.150	Open Manhole	1200
17.003	58.949	133.9	TR12362501	76.040	73.150	2.740	Junction	
18.000	86.874	97.6	TR12361502	75.080	73.730	1.200	Open Manhole	1200
18.001	21.369	101.8	TR12361601	74.870	73.520	1.200	Open Manhole	1200
18.002	87.933	134.2	TR12362501	76.040	72.865	3.025	Junction	

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				<u>Upstre</u>	eam Manh	<u>nole</u>			
PN	Hvd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W	
	Sect		Name	(m)	(m)	(m)	Connection	(mm)	
17.00	4 o	150	TR12362501	76.040	72.865	3.025	Junction		
17.00	5 о	150	TR12362502	75.580	72.440	2.990	Open Manhole	1200	
17.00	6 о	150	TR12363503	74.780	72.010		Open Manhole	1200	
17.00	7 о	150	TR12363504	74.410	71.589	2.671	Open Manhole	1200	
19.00	0 0	150	TR12362301	79.670	78.320	1.200	Open Manhole	1200	
				<u>Downstı</u>	ream Mar	hole			
PN	Length	Slope	e MH	C Level	L I.Level	D Denth	МН	MH DIAM., L*W	
EN		(1:X)		(m)	(m)	(m)	Connection	(mm)	
17.004	57.073	134.2	TR12362502	75.580	72.440	2.990	Open Manhole	e 1200	
			TR12363503				Open Manhole		
17.006	56.422	134.2	TR12363504	74.410	71.589		Open Manhole		
17.007	65.583	134.2	TR12364502	74.870	71.101	3.619	Junction	1	
19.000	95.427	37.3	TR12363401	77.110	75.760	1.200	Junction	1	
			(D1982-2	019 Inn	ovyze			

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	PN	Hyd	Diam	MH	C.Level	I.Level I	.Depth	MH	MH DIAM., L*W	
		Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)	
	20.000	0	150	TR12363301	79.030	77.680	1.200	Open Manhole	1200	
	19.001	. 0	150	TR12363401	77.110	75.760	1.200	Junction		
	19.002			IR12363505				Open Manhole	1200	
	19.003							Open Manhole	1200	
	19.004	0	150	TR12364501	75.970	73.435	2.385	Open Manhole	1200	
	16.008	0	225	TR12364502	74.870	71.101	3.544	Junction		
					Downstr	ream Man	<u>hole</u>			
	PN	Length	Slope	МН	C.Level	. I.Level	D.Depth	n MH	MH DIAM., L*W	
		(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)	
20	0.000	48.653	25.3	TR12363401	77.110	75.760	1.200	Junctior	1	
19	9.001	68.996	47.3	TR12363505	75.650	74.300	1.200) Open Manhole	e 1200	
				TR12363501				Open Manhole		
				TR12364501				Open Manhole		
19	9.004	37.816	134.5	TR12364502	74.870	73.154	1.566	-		
16	6.008	68.698	193.2	TR12364601	73.500	70.745	2.530	Open Manhole	e 1200	
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<u>Upstream Manhole</u>

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
	Sect	(11111)	Name	(111)	(111)	(111)	connection	(11011)
16.009	0	225	TR12364601	73.500	70.745	2.530	Open Manhole	1200
14.018	0	450	102	72.700	68.552	3.698	Open Manhole	1350
21.000	0	450	TR11362602	76.390	74.740	1.200	Open Manhole	1350
21.001	0	450	TR11361701	76.470	74.564	1.456	Open Manhole	1350
21.002	0	450	TR11360702	75.240	73.590	1.200	Open Manhole	1350

<u>Downstream Manhole</u>

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
16.009	27.482	193.2	102	72.700	70.603	1.872	Open Manhole	1350
14.018	63.614	500.0	PS1	73.600	68.425	4.725	Open Manhole	0
21.000 21.001 21.002	92.693	95.2	TR11361701 TR11360702 TR10369802	76.470 75.240 74.220	74.564 73.590 72.570		Open Manhole Open Manhole Junction	1350 1350

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
22.000	0	150	TR10367702	79.610	78.260	1.200	Open Manhole	1200
22.001	0	150	TR10368701	78.090	76.740	1.200	Open Manhole	1200
22.002	0	150	TR10369701	75.590	74.240	1.200	Open Manhole	1200
21.003	0	450	TR10369802	74.220	72.570	1.200	Junction	
21.004	0	600	TR10369801	73.900	72.100	1.200	Open Manhole	1500
21.005	0	600	TR10368901	74.160	71.980	1.580	Open Manhole	1500
21.006	0	600	TR10368902	74.390	71.855	1.935	Open Manhole	1500

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
22.000	77.884	51.2	TR10368701	78.090	76.740	1.200	Open Manhole	1200
22.001	42.810	17.1	TR10369701	75.590	74.240	1.200	Open Manhole	1200
22.002	60.689	36.3	TR10369802	74.220	72.570	1.500	Junction	
21.003	58.409	124.3	TR10369801	73.900	72.100	1.350	Open Manhole	1500
21.004	59.943	500.0	TR10368901	74.160	71.980	1.580	Open Manhole	1500
21.005	62.751	500.0	TR10368902	74.390	71.855	1.935	Open Manhole	1500
21.006	60.280	500.0	TR10378001	74.010	71.734	1.676	Open Manhole	1500

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
21.007	0	600	TR10378001	74.010	71.734	1.676	Open Manhole	1500
21.008	0	600	TR10378101	73.110	71.310	1.200	Open Manhole	1500
21.009	0	600	TR10378201	71.680	69.880	1.200	Open Manhole	1500
21.010	0	600	TR10378202	70.510	68.710	1.200	Open Manhole	1500
21.011	0	600	TR10378301	68.880	67.080	1.200	Junction	
21.012	0	600	TR10377301	69.090	66.946	1.544	Open Manhole	1500
21.013	0	600	TR10376201	68.560	66.760	1.200	Open Manhole	1500
21.014	0	600	TR10376301	65.730	63.930	1.200	Open Manhole	1500

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
21.007	60.860	143.5	TR10378101	73.110	71.310	1.200	Open Manhole	1500
21.008	103.068	72.1	TR10378201	71.680	69.880	1.200	Open Manhole	1500
21.009	90.980	77.8	TR10378202	70.510	68.710	1.200	Open Manhole	1500
21.010	49.104	30.1	TR10378301	68.880	67.080	1.200	Junction	
21.011	66.813	500.0	TR10377301	69.090	66.946	1.544	Open Manhole	1500
21.012	77.976	418.4	TR10376201	68.560	66.760	1.200	Open Manhole	1500
21.013	84.630	29.9	TR10376301	65.730	63.930	1.200	Open Manhole	1500
21.014	87.822	19.6	TR10376401	61.240	59.440	1.200	Open Manhole	1500

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
21.015	0	600	TR10376401	61.240	59.440	1.200	Open Manhole	1500
23.000	0	150	TR10367701	81.170	79.820	1.200	Open Manhole	1200
23.001	0	150	TR10366801	80.030	78.680	1.200	Open Manhole	1200
23.002	0	150	TR10366901	76.860	75.510	1.200	Open Manhole	1200
23.003	0	150	TR10376001	73.370	72.020	1.200	Open Manhole	1200
23.004	0	150	TR10375001	73.700	71.262	2.288	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
21.015	136.739	109.4	TR10374302	59.990	58.190	1.200	Junction	
23.001 23.002	109.491 102.151 102.006	34.5 29.3 134.6	TR10366801 TR10366901 TR10376001 TR10375001 TR10374001	80.030 76.860 73.370 73.700 76.370	78.680 75.510 72.020 71.262 70.754	1.200 1.200	Open Manhole Open Manhole Open Manhole Junction	1200 1200 1200 1200

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
24.000	0	150	TR10373201	78.040	76.690	1.200	Open Manhole	1200
24.001	0	150	TR10374101	77.040	75.690	1.200	Open Manhole	1200
23.005	0	150	TR10374001	76.370	70.754	5.466	Junction	
23.006	0	150	TR10375101	70.160	68.810	1.200	Open Manhole	1200
23.007	0	150	TR10375201	64.720	63.370	1.200	Open Manhole	1200
23.008	0	150	TR10374301	63.790	62.440	1.200	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
24.000	95.540	95.5	TR10374101	77.040	75.690	1.200	Open Manhole	1200
24.001	104.823	135.6	TR10374001	76.370	74.917	1.303	Junction	
23.005	73.574	37 9	TR10375101	70.160	68.810	1 200	Open Manhole	1200
23.006	74.759		TR10375201	64.720	63.370		Open Manhole	1200
23.007	73.584	79.1	TR10374301	63.790	62.440	1.200	Open Manhole	1200
23.008	47.087	11.1	TR10374302	59.990	58.190	1.650	Junction	

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
21.016	0	600	TR10374302	59.990	58.190	1.200	Junction	
21.017	0	600	TR10374401	59.700	57.900	1.200	Open Manhole	1500
21.018	0	600	TR10373401	62.490	57.730	4.160	Open Manhole	1500
21.019	0	600	TR10373501	60.450	57.543	2.307	Open Manhole	1500
21.020	0	600	TR10372501	62.480	57.410	4.470	Open Manhole	1500
21.021	0	600	TR10372601	60.680	57.315	2.765	Open Manhole	1500
21.022	0	600	TR10371502	57.430	55.630	1.200	Open Manhole	1500
21.023	0	600	TR10370501	56.680	54.880	1.200	Open Manhole	1500

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
21.016	80.894	278.9	TR10374401	59.700	57.900	1.200	Open Manhole	1500
21.017	85.231	500.0	TR10373401	62.490	57.730	4.160	Open Manhole	1500
21.018	93.315	500.0	TR10373501	60.450	57.543	2.307	Open Manhole	1500
21.019	66.366	500.0	TR10372501	62.480	57.410	4.470	Open Manhole	1500
21.020	47.384	500.0	TR10372601	60.680	57.315	2.765	Open Manhole	1500
21.021	100.818	59.8	TR10371502	57.430	55.630	1.200	Open Manhole	1500
21.022	81.883	109.2	TR10370501	56.680	54.880	1.200	Open Manhole	1500
21.023	63.050	500.0	TR09379501	57.050	54.754	1.696	Open Manhole	1500

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P.O. Box 161		
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XP Solutions	Network 2019.1	

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
21.024	0	600	TR09379501	57.050	54.754	1.696	Open Manhole	1500
25.000	0	150	TR10356901	95.690	94.340	1.200	Open Manhole	1200
25.001	0	150	TR10366001	95.480	93.343	1.987	Open Manhole	1200
25.002	0	150	TR10366101	94.090	92.377	1.563	Open Manhole	1200
25.003	0	150	TR10366301	91.260	89.910	1.200	Open Manhole	1200
25.004	0	225	TR10365401	90.660	88.867	1.568	Open Manhole	1200
25.005	0	225	TR10365501	90.270	88.297	1.748	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH			D.Depth		MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
21.024	43.990	381.3	TR09379502	56.840	54.639	1.601	Junction	
25.000	133.481	133.9	TR10366001	95.480	93.343	1.987	Open Manhole	1200
25.001	121.730	126.0	TR10366101	94.090	92.377	1.563	Open Manhole	1200
25.002	104.933	42.5	TR10366301	91.260	89.910	1.200	Open Manhole	1200
25.003	131.560	126.2	TR10365401	90.660	88.867	1.643	Open Manhole	1200
25.004	132.635	232.6	TR10365501	90.270	88.297	1.748	Open Manhole	1200
25.005	114.381	32.1	TR10365601	86.160	84.735	1.200	Open Manhole	1200

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P.O. Box 161		
AD Arnhem		A contraction
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Date 09/02/2022 11:45	Designed by aga77500	Drainage
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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
25.006	0	225	TR10365601	86.160	84.735	1.200	Open Manhole	1200
25.007	0	225	TR10364601	83.489	82.064	1.200	Open Manhole	1200
25.008	0	225	TR10363601	81.209	79.784	1.200	Open Manhole	1200
25.009	0	225	TR10363501	79.650	78.225	1.200	Open Manhole	1200
26.000	0	150	TR10354901	82.130	80.780	1.200	Open Manhole	1200
26.001	0	225	TR10364001	79.710	78.285	1.200	Open Manhole	1200
26.002	0	225	TR10363101	79.130	77.705	1.200	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
25.006	111.193	41.6	TR10364601	83.489	82.064	1.200	Open Manhole	1200
25.007	98.617	43.3	TR10363601	81.209	79.784	1.200	Open Manhole	1200
25.008	101.663	65.2	TR10363501	79.650	78.225	1.200	Open Manhole	1200
25.009	131.041	16.1	TR10362501	71.489	70.064	1.200	Junction	
26.000	76.165	30.5	TR10364001	79.710	78.285	1.275	Open Manhole	1200
26.001	69.905	120.5	TR10363101	79.130	77.705	1.200	Open Manhole	1200
26.002	35.445	86.5	TR10363102	78.720	77.295	1.200	Open Manhole	1200

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P.O. Box 161		
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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
26.003	0	225	TR10363102	78.720	77.295	1.200	Open Manhole	1200
26.004	0	225	TR10364101	80.260	77.009	3.026	Open Manhole	1200
26.005	0	225	TR10364201	78.720	76.819	1.676	Open Manhole	1200
26.006	0	225	TR10364202	79.540	76.581	2.734	Open Manhole	1200
26.007	0	225	TR10364301	78.919	76.356	2.338	Open Manhole	1200
26.008	0	225	TR10363301	75.339	73.914	1.200	Open Manhole	1200
26.009	0	225	TR10362401	73.129	71.704	1.200	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
26.003	66.428	232.0	TR10364101	80.260	77.009	3.026	Open Manhole	1200
26.004	44.046	232.0	TR10364201	78.720	76.819	1.676	Open Manhole	1200
26.005	55.064	232.0	TR10364202	79.540	76.581	2.734	Open Manhole	1200
26.006	52.258	232.0	TR10364301	78.919	76.356	2.338	Open Manhole	1200
26.007	88.308	36.2	TR10363301	75.339	73.914	1.200	Open Manhole	1200
26.008	115.776	52.4	TR10362401	73.129	71.704	1.200	Open Manhole	1200
26.009	99.165	60.5	TR10362501	71.489	70.064	1.200	Junction	

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
25.010	0	225	TR10362501	71.489	70.064	1.200	Junction	
25.011	0	225	TR10361501	69.740	68.240	1.275	Open Manhole	1200
25.012	0	225	TR10360501	67.330	65.830	1.275	Open Manhole	1200
25.013	0	300	TR09369601	65.780	64.280	1.200	Open Manhole	1200
25.014	0	300	TR09368601	64.860	63.360	1.200	Open Manhole	1200
25.015	0	300	TR09368702	64.330	62.830	1.200	Open Manhole	1200
25.016	0	300	TR09368801	62.890	61.390	1.200	Open Manhole	1200
25.017	0	300	TR09368901	62.160	60.660	1.200	Open Manhole	1200

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
25.010	103.159	56.6	TR10361501	69.740	68.240	1.275	Open Manhole	1200
25.011	119.376	49.5	TR10360501	67.330	65.830	1.275	Open Manhole	1200
25.012	90.908	58.7	TR09369601	65.780	64.280	1.275	Open Manhole	1200
25.013	80.345	87.3	TR09368601	64.860	63.360	1.200	Open Manhole	1200
25.014	106.327	200.6	TR09368702	64.330	62.830	1.200	Open Manhole	1200
25.015	44.448	30.9	TR09368801	62.890	61.390	1.200	Open Manhole	1200
25.016	122.166	167.4	TR09368901	62.160	60.660	1.200	Open Manhole	1200
25.017	125.378	267.2	TR09378001	62.110	60.191	1.619	Open Manhole	1350

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<u>Upstream Manhole</u>

PN	-	Diam	MH	C.Level		-		MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
25.018	0	375	TR09378001	62.110	60.191	1.544	Open Manhole	1350
27.000	0	150	TR10372201	78.820	77.470	1.200	Open Manhole	1200
27.001	0	150	TR10371102	77.580	76.230	1.200	Open Manhole	1200
28.000	0	150	TR10360901	78.270	76.920	1.200	Open Manhole	1200
28.001	0	150	TR10371001	77.360	76.010	1.200	Open Manhole	1200

<u>Downstream Manhole</u>

MH DIAM., L*W (mm)	MH Connection	D.Depth (m)	I.Level (m)	C.Level (m)	MH Name	Slope (1:X)	Length (m)	PN
	Junction	1.200	59.805	61.380	TR09379103	305.9	118.041	25.018
1200	Open Manhole Junction	1.200 1.329			TR10371102 TR10371101			27.000 27.001
1200	Open Manhole Junction	1.200 1.712	76.010 75.338	77.360 77.200	TR10371001 TR10371101		82.032 89.918	28.000 28.001

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<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
27.002	0	150	TR10371101	77.200	75.338	1.712	Junction	
27.003	0	150	TR10370101	74.450	73.100	1.200	Open Manhole	1200
27.004	0	150	TR10370102	70.530	69.180	1.200	Open Manhole	1200
27.005	0	150	TR09379101	65.720	64.370	1.200	Open Manhole	1200
25.019	0	375	TR09379103	61.380	59.805	1.200	Junction	
25.020	0	375	TR09379201	57.890	56.315	1.200	Open Manhole	1350
25.021	0	375	TR09379301	56.730	55.155	1.200	Open Manhole	1350

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
27.002	60.252	26.9	TR10370101	74.450	73.100	1.200	Open Manhole	1200
27.003	69.607	17.8	TR10370102	70.530	69.180	1.200	Open Manhole	1200
27.004	63.719	13.2	TR09379101	65.720	64.370	1.200	Open Manhole	1200
27.005	34.294	7.5	TR09379103	61.380	59.805	1.425	Junction	
25.019	123.532	35.4	TR09379201	57.890	56.315	1.200	Open Manhole	1350
25.020	64.703	55.8	TR09379301	56.730	55.155	1.200	Open Manhole	1350
25.021	63.158	274.6	TR09379401	56.500	54.925	1.200	Open Manhole	1350

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<u> PIPELINE SCHEDULES for Foul - Main</u>

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
25.022	0	375	TR09379401	56.500	54.925	1.200	Open Manhole	1350
25.023	0	375	TR09379503	56.450	54.716	1.359	Open Manhole	1350
21.025	0	600	TR09379502	56.840	54.639	1.601	Junction	
21.026	0		TR09378601	55.780	53.830		Open Manhole	1500
21.027	0	675	TR09377602	56.330	53.642	2.013	Open Manhole	1500
21.028	0	675	TR09377601	57.510	53.522	3.313	Open Manhole	1500
21.029	0	675	TR09376601	54.920	53.045	1.200	Open Manhole	1500

<u>Downstream Manhole</u>

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
25.022	94.415	452.5	TR09379503	56.450	54.716	1.359	Open Manhole	1350
25.023	35.220	452.5	TR09379502	56.840	54.639	1.826	Junction	
21 025	76 954	95 2	TR09378601	55,780	53.830	1 350	Open Manhole	1500
			TR09377602	56.330	53.642		Open Manhole	1500
21.027	60.216	500.0	TR09377601	57.510	53.522	3.313	Open Manhole	1500
21.028	91.924	192.8	TR09376601	54.920	53.045	1.200	Open Manhole	1500
21.029	75.961	500.0	TR09375602	55.330	52.893	1.762	Open Manhole	1500

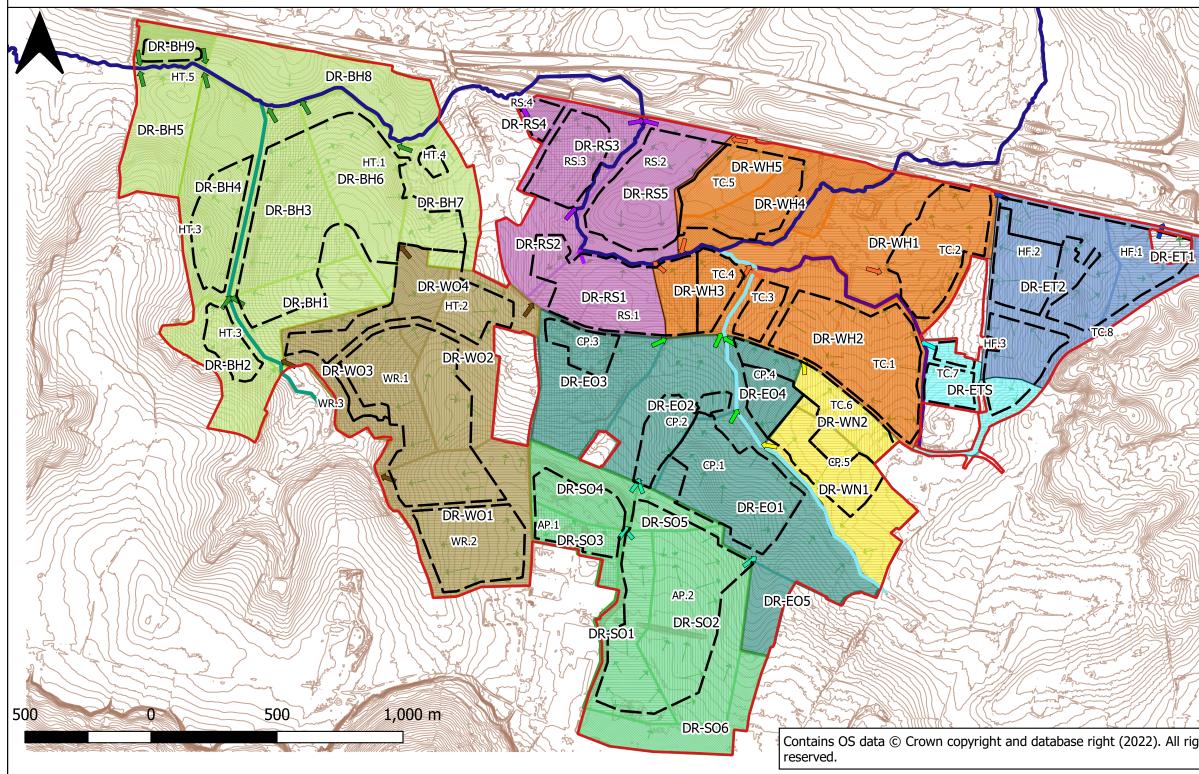
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				PIPELINE		<u>LES for</u> am Manho		<u>- Main</u>		
	PN	-	Diam (mm)	MH (Name	C.Level : (m)	I.Level D (m)	.Depth (m)	MH M Connection	H DIAM., L*W (mm)	
	21.03							Open Manhole	1500	
					<u>Downstr</u>	eam Manl	<u>nole</u>			
	PN	Length (m)	Slope (1:X)		C.Level (m)	I.Level (m)	D.Depti (m)	h MH Connection	MH DIAM., L*W (mm)	
	21.030	11.045	500.0	Onsite_WwTW	₫ 55.970	52.871	2.424	4 Open Manhole	0	
1					21000 07	10 -				
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APPENDIX J

Surface Water Drainage Concept Strategy

		Remaining			Remaining		Post-Development Case												
Drainage	Positively Drained	Permeable	Drainage	Positively Drained	Permeable		Allowable P	ositively Dra	ined Runoff	Runoff	From Permeab	le Areas		Allowable	Positively Drai	ned Runoff	Runoff F	rom Permeab	ole Areas
Zone Name	Area (ha)	Area (ha)	Zone Name	Area (ha)	Area (ha)	Drainage Zone	1 in 1 year (l/s)	1 in 30 year (l/s)	1 in 100 year (l/s)	1 in 1 year (I/s)	1 in 30 year (l/s)	1 in 100 year (l/s)	Drainage Zone	1 in 1 year (l/s)	1 in 30 year (l/s)	1 in 100 year (l/s)	1 in 1 year (l/s)	1 in 30 year (l/s)	1 in 100 year (l/s)
DR-WH1	10.90	21.90	DR-S06	0.00	9.88	DR-WH1	9.8	22.9	32.7	19.7	46.0	65.7	DR-S06	0.0	0.0	0.0	8.9	20.7	19.8
DR-WH2	18.41	12.07	DR-W01	13.10	14.68	DR-WH2	16.6	38.7	55.2	10.9	25.3	36.2	DR-W01	11.8	27.5	26.2	13.2	30.8	29.4
DR-WH3	7.25	2.97	DR-W02	10.30	10.59	DR-WH3	6.5	15.2	21.8	2.7	6.2	8.9	DR-W02	9.3	21.6	20.6	9.5	22.2	21.2
DR-WH4	5.42	10.37	DR-W03	11.74	10.42	DR-WH4	4.9	11.4	16.3	9.3	21.8	31.1	DR-W03	10.6	24.6	23.5	9.4	21.9	20.8
DR-WH5	5.00	3.42	DR-W04	5.31	1.11	DR-WH5	4.5	10.5	15.0	3.1	7.2	10.3	DR-W04	4.8	11.2	10.6	1.0	2.3	2.2
DR-E01	11.51	18.09	DR-BH1	3.07	9.31	DR-E01	10.4	24.2	23.0	16.3	38.0	36.2	DR-BH1	2.8	6.4	6.1	8.4	19.6	18.6
DR-E02	4.26	13.74	DR-BH2	2.56	10.19	DR-E02	3.8	8.9	8.5	12.4	28.9	27.5	DR-BH2	2.3	5.4	5.1	9.2	21.4	20.4
DR-E03	2.95	15.66	DR-BH3	10.96	9.81	DR-E03	2.7	6.2	5.9	14.1	32.9	31.3	DR-BH3	9.9	23.0	21.9	8.8	20.6	19.6
DR-E04	5.55	2.51	DR-BH4	5.42	15.62	DR-E04	5.0	11.7	11.1	2.3	5.3	5.0	DR-BH4	4.9	11.4	10.8	14.1	32.8	31.2
DR-E05	0.00	4.84	DR-BH5	1.06	11.70	DR-E05	0.0	0.0	0.0	4.4	10.2	9.7	DR-BH5	1.0	2.2	2.1	10.5	24.6	23.4
DR-WN1	8.40	9.52	DR-BH6	10.00	8.64	DR-WN1	7.6	17.6	25.2	8.6	20.0	28.6	DR-BH6	9.0	21.0	20.0	7.8	18.2	17.3
DR-WN2	5.16	1.39	DR-BH7	4.19	9.61	DR-WN2	4.6	10.8	15.5	1.3	2.9	4.2	DR-BH7	3.8	8.8	8.4	8.7	20.2	19.2
DR-ET1	4.43	4.20	DR-BH8	0.00	19.77	DR-ET1	4.0	9.3	13.3	3.8	8.8	12.6	DR-BH8	0.0	0.0	0.0	17.8	41.5	39.5
DR-ET2	19.88	11.41	DR-BH9	1.36	3.35	DR-ET2	17.9	41.8	59.6	10.3	24.0	34.2	DR-BH9	1.2	2.9	2.7	3.0	7.0	6.7
DR-ETS	4.89	4.42	DR-RS1	9.44	3.29	DR-ETS	4.4	10.3	14.7	4.0	9.3	13.3	DR-RS1	8.5	19.8	28.3	3.0	6.9	9.9
DR-S01	7.18	7.04	DR-RS2	1.71	6.90	DR-S01	6.5	15.1	14.4	6.3	14.8	14.1	DR-RS2	1.5	3.6	5.1	6.2	14.5	20.7
DR-S02	12.68	13.50	DR-RS3	6.48	5.70	DR-S02	11.4	26.6	25.4	12.2	28.4	27.0	DR-RS3	5.8	13.6	19.4	5.1	12.0	17.1
DR-S03	3.02	2.68	DR-RS4	1.29	0.96	DR-S03	2.7	6.3	6.0	2.4	5.6	5.4	DR-RS4	1.2	2.7	3.9	0.9	2.0	2.9
DR-S04	4.02	5.48	DR-RS5	12.45	7.01	DR-S04	3.6	8.5	8.0	4.9	11.5	11.0	DR-RS5	11.2	26.1	37.3	6.3	14.7	21.0
DR-S05	1.68	2.23	TOTAL	253.01	335.99	DR-S05	1.5	3.5	3.4	2.0	4.7	4.5	TOTAL	227.7	531.3	627.1	302.4	705.6	777.5



Leger	
	OPA Site Boundary
	East Stour River
Key Sit	e Tributaries
	Harringe Brook
_	North Lympne Drain
	Racecourse Drain
\longrightarrow	Surface Flow Direction
Î	Indicative Key Drainage Outfall Locations
XX.X	Proposed Development Area Reference
	Proposed Development Boundary
Draina	ge Zones
	Barrow Hill (DR-BH1 to DR-BH9)
	East Otterpool (DR-EO1 to DR-EO5)
	East Triangle (DR-ET1 to DR-ET2)
	East Triangle South (DR-ETS)
	River Stour (DR-RS1 to DR-RS5)
	South Otterpool (DR-SO1 to DR-SO6)
	West Newingreen (DR-WN1 to DR-WN2)
	West Otterpool (DR-W01 to DR-WO4)
	Westhanger (DR-WH1 to DR-WH5)

lotes.

Notes. 1. The indicative outfall locations and discharge rates may be refined during the detailed design stage, using the principles set out in this drawing and associated Arcadis report 10029956-AUK-XX-XX-RP-CW-0010-P3-Flood Risk Assessment and Surface Water Drainane Strateny.

10029956-AUK-XXC-XX-RP-CW-0010-P3-Flood Risk Assessment and Surface Water Drainage Strategy. 2. Allowable runoff rates (I/s/ha) from all positively drained areas where good infiltration is feasible in permeable soil types subject to further soakaway testing and ensuring suitable 50% storage drain-down time: Q1 = 0.9: (30 = 2.1; Q100 = 2.0. 3. Allowable runoff rates (I/s/ha) from all positively drained areas where infiltration is infeasible due to impermeable soil types: Q1 = 0.9: Q30 = 2.1; Q100 = 3.0. 4. Proposed positive drainage outfalls must have a suitable Staged discharge arrangement to limit the above allowable runoff rates for Q1, Q30 and Q100. 5. All permeable areas that are not positively drained will continue to discharge at the existing greenfield runoff rates (I/s/ha): Q1 = 0.9: Q30 = 2.1; Q100 = 3.0. 6. The outline drainage strategy demonstrates that post-development runoff for Q1 and Q30 are unchanged whereas as a minimum there will be a reduction of 362 l/s for Q100 when compared with the pre-development runoff.

Revision	Date	Status	Author	Checker	Approver
P7	03/03/2022	FINAL	JP	AG	RG

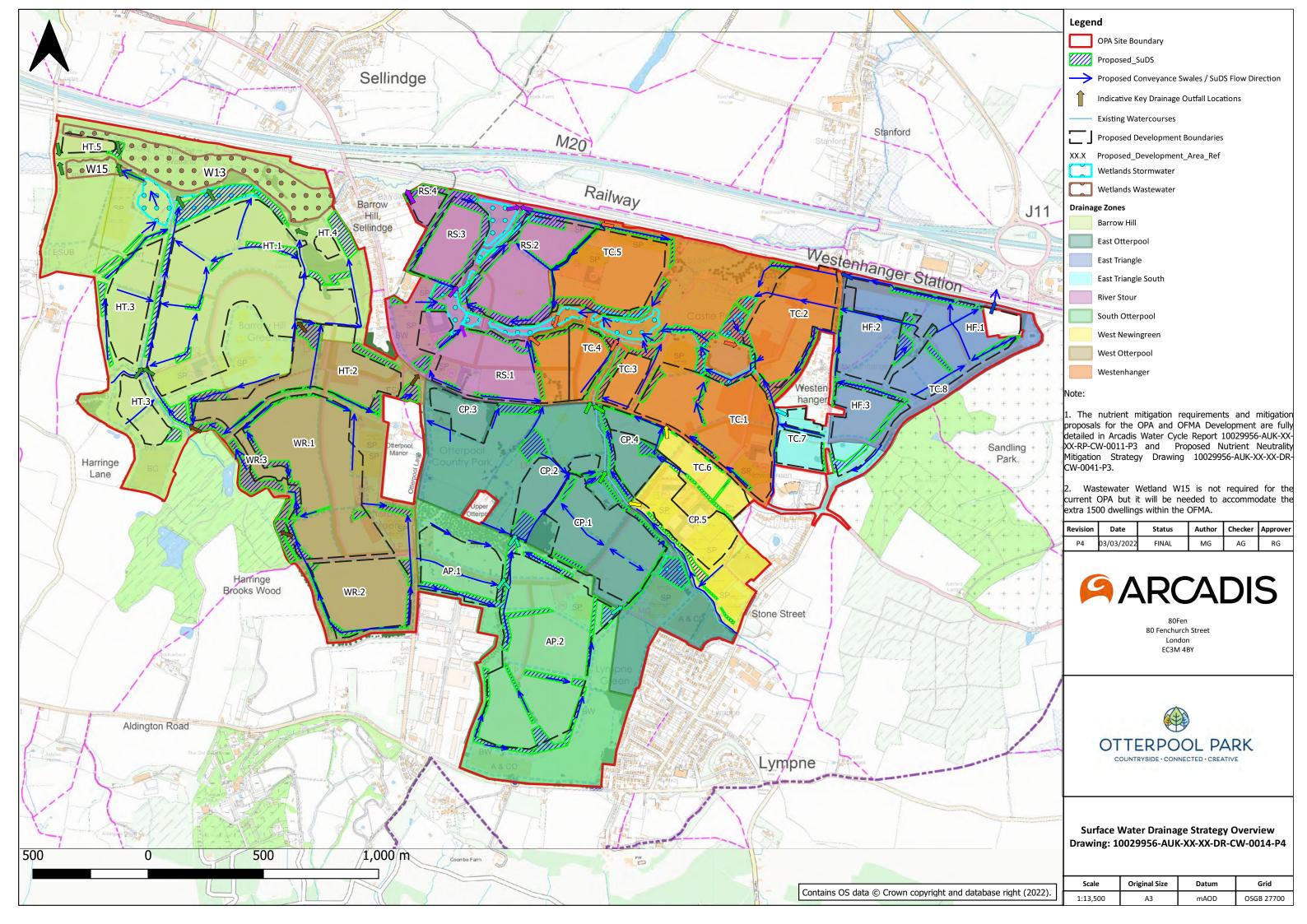


80Fen 80 Fenchurch Street London EC3M 4BY



Surface Water Drainage Zones & Runoff Rates Drawing: 10029956-AUK-XX-XX-DR-CW-0007-P7

ghts	Scale	Original Size	Datum	Grid	
	1:15000	A3	mAOD	OSGB 27700	



Micro drainage storage estimate outputs with 40% climate change allowance and 50% drain down time

Zone	b-Zone	e (m/hr)	Average Attenuation Storage	Requirement, including 40% climate change allowance (m³)	SuDS Space Requirement	wun r.um Average Depth (ha)	S Space on Site	ortfall for 1 in 100 ce(ha)	: 50% Drain-down :s)
Drainage Zone	Drainage Sub-Zone	Infiltration Rate (m/hr)	1 in 100 annual chance	1 in 30 annual chance	1 in 100 annual chance	1 in 30 annual chance	Available Strategic SuDS Space on Site (ha)	SuDS Area Surplus/ Shortfall for 1 in 100 annual chance(ha)	1 in 100 annual chance 50% Drain-down Time (hrs)
	DR-WH1	0.00000	16,436	12,374	2.14	1.61	4.80	2.66	23.2
	DR-WH2	0.00000	27,765	20,896	3.61	2.72	2.83	-0.78	42.2
	DR-WH3	0.00000	10,927	8,235	1.42	1.07	1.55	0.13	49.5
Westenh anger	DR-WH4	0.00000	8,168	6,151	1.06	0.80	2.03	0.97	23.9
	DR-WH5	0.00000	7,540	5,677	0.98	0.74	0.91	-0.07	41.5
	DR-EO1	0.00763	14,284	10,245	1.86	1.33	2.86	1.00	16.6
	DR-E02	0.00156	6,343	4,427	0.82	0.58	1.98	1.15	19.8
East	DR-EO3	0.00156	4,391	30,69	0.57	0.40	0.73	0.16	15.1
Otterpool	DR-EO4	0.00156	8,260	5,771	1.07	0.75	1.74	0.67	48.5
	DR-EO5	0.00763	0	0	0.00	0.00		0.00	0.0
	DR-WN1	0.00000	12,667	9,543	1.65	1.24	0.85	-0.80	32.7
West Newingre en	DR-WN2	0.00000	7,779	5,864	1.01	0.76	0.64	-0.37	55.0
	DR-ET1	0.00006	6,658	5,009	0.87	0.65	0.80	-0.07	35.5

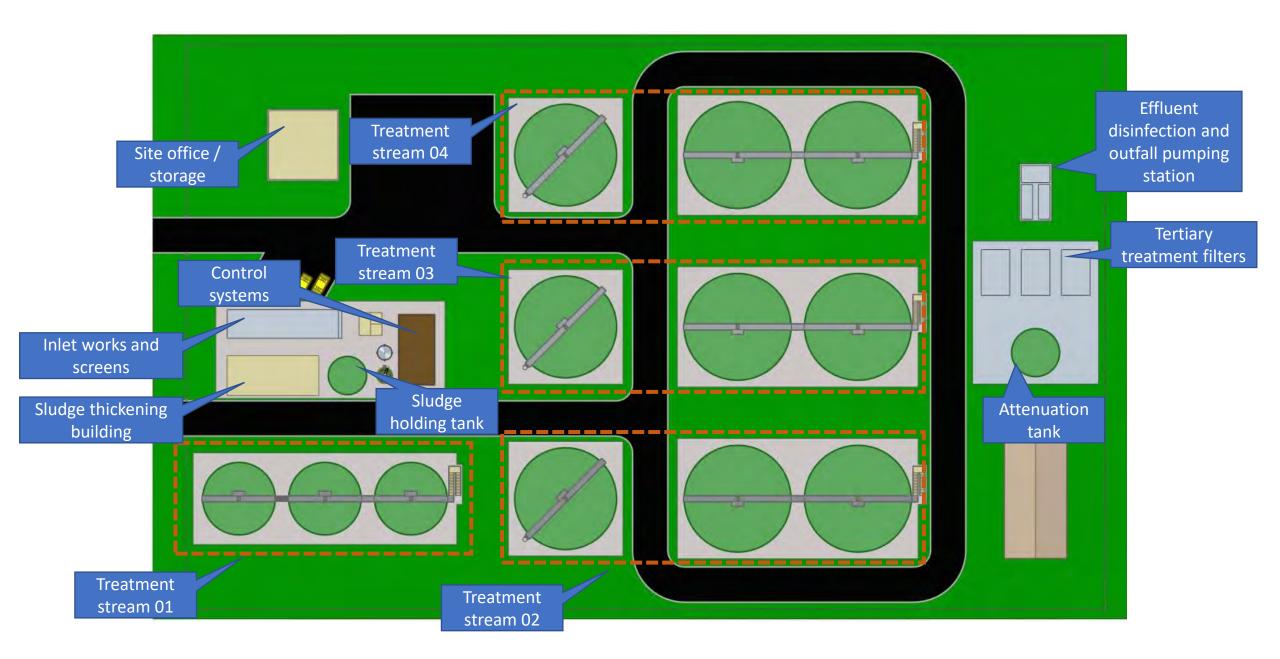
one	-Zone	· (m/hr)	Average Attenuation Storage	Requirement, including 40% climate change allowance (m ³)	SuDS Space Requirement	with 1.0m Average Depth (ha)	Space on Site	ortfall for 1 in 100 e(ha)	50% Drain-down \$)
Drainage Zone	Drainage Sub-Zone	Infiltration Rate (m/hr)	1 in 100 annual chance	1 in 30 annual chance	1 in 100 annual chance	1 in 30 annual chance	Available Strategic SuDS Space on Site (ha)	SuDS Area Surplus/ Shortfall for 1 in 100 annual chance(ha)	1 in 100 annual chance 50% Drain-down Time (hrs)
East Triangle	DR-ET2	0.00006	29,890	22,477	3.89	2.92	3.52	-0.36	43.9
East Triangle South	DR-ETS	0.00006	7,348	5,526	0.96	0.72	0.89	-0.07	36.3
	DR-S01	0.00763	8,907	6,391	1.16	0.83	2.35	1.19	15.8
	DR-SO2	0.00763	15,731	11,292	2.05	1.47	2.90	0.85	19.2
South	DR-S03	0.00763	3,751	2,693	0.49	0.35	0.80	0.31	18.4
Otterpool	DR-S04	0.00763	4,984	3,574	0.65	0.46	0.32	-0.33	26.9
	DR-S05	0.00763	2,082	1,498	0.27	0.19	0.78	0.51	11.9
	DR-S06	0.00763	0	0	0.00	0.00		0.00	0.0
	DR-WO1	0.00075	20,452	14,143	2.66	1.84	3.07	0.41	45.9
West Otterpool	DR-W02	0.00075	16,081	11,123	2.09	1.45	1.69	-0.41	49.3
	DR-W03	0.00075	18,326	12,668	2.38	1.65	5.39	3.01	45.9
	DR-W04	0.00075	8,293	57,26	1.08	0.74	1.01	-0.07	77.1
	DR-BH1	0.01555	3,404	2,431	0.44	0.32	0.98	0.54	7.1
	DR-BH2	0.01555	2,838	2,023	0.37	0.26	0.32	-0.05	10.0

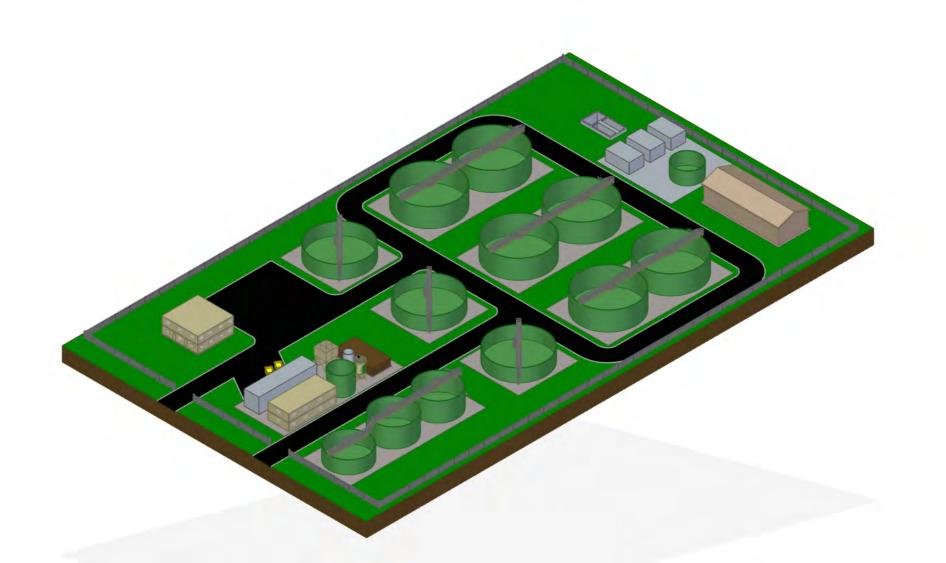
Drainage Zone	Drainage Sub-Zone	Infiltration Rate (m/hr)	1 in 100 annual Average chance Attenuation Storage	Requirement, 1 in 30 annual chance including 40% climate change allowance (m ³)	1 in 100 annual SuDS Space chance Requirement	With 1.0m 1 in 30 annual chance Average Depth (ha)	Available Strategic SuDS Space on Site (ha)	SuDS Area Surplus/ Shortfall for 1 in 100 annual chance(ha)	1 in 100 annual chance 50% Drain-down Time (hrs)
	DR-BH3	0.01555	12,147	8,669	1.58	1.13	2.62	1.04	10.9
	DR-BH4	0.01555	6,008	4,285	0.78	0.56	1.44	0.66	8.0
Barrow Hill	DR-BH5	0.01555	1,176	840	0.15	0.11	0.01	-0.15	6.3
	DR-BH6	0.01555	11,082	7,908	1.44	1.03	2.33	0.89	11.1
	DR-BH7	0.01555	4,643	3,314	0.60	0.43	1.57	0.97	6.8
	DR-BH8	0.01555	0	0	0.00	0.00	0.04	0.04	0.0
	DR-BH9	0.00000	1,508	1,074	0.30	0.14	0.25	0.06	4.3
	DR-RS1	0.00000	14,238	10,721	1.85	1.39	1.11	-0.75	51.8
River	DR-RS2	0.00000	2,583	1,940	0.34	0.25	0.98	0.64	13.9
Stour	DR-RS3	0.00000	9,777	7,359	1.27	0.96	2.93	1.66	37.2
	DR-RS4	0.00000	1,942	1,466	0.25	0.19	0.56	0.31	40.0
	DR-RS5	0.00000	18,780	14,142	2.44	1.84	4.61	2.17	44.7
TOTAL* SITE	N/A	N/A	357,177	260,536	46.43	33.87	64.15	17.72	N/A

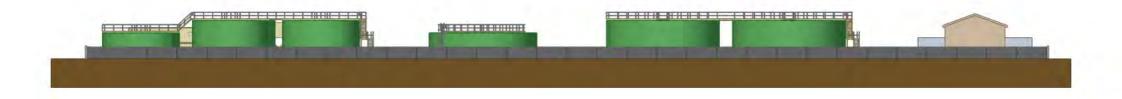
* Totals are slightly different to sums of individual values due to rounding effects not shown

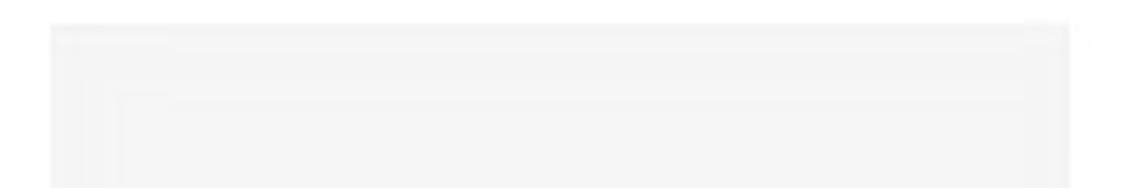
APPENDIX K

Preliminary Onsite WwTW Plant Proposals











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