Castle Point Wastewater Capacity Assessment

Castle Point Borough Council

Project number: 60725540

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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
P01	January 2026	Draft	RM	Richard Moore	Project Manager
P02	February 2026	Final – amended dwelling numbers and client comments	RM	Richard Moore	Project Manager

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Figures

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Tables

1. Introduction

1.1.1. AECOM has been commissioned to undertake an initial wastewater capacity assessment for Castle Point Borough Council (CPBC). The aim of this initial assessment is to inform the council's emerging spatial strategies for growth and allocation of sites, through identifying where wastewater treatment capacity could constrain higher levels of growth. This initial process has:

- Provided an estimate of the approximate number of dwellings (dwelling capacity assessment) that could be supported by the existing Water Recycling Centres (WRCs) without significant upgrades and/or requirements for new permits to discharge to the environment; and,
- Identified where there is a water quality or environmental capacity risk in cases where growth is likely to exceed the number of dwellings which a WRC could potentially support.

1.1.2. This report summarises the process and outputs of this initial wastewater capacity assessment.

2. Study drivers

There are several legislative, regulatory and policy level drivers which shape the approach to wastewater capacity assessment calculations, which are outlined below:

2.1 National planning policy

2.1.1. The National Planning Policy Framework (NPPF)[1] includes several water-related requirements which influence the need for, and direction of the wastewater capacity assessments. Paragraph 20 states that strategic policies in development plan documents should make sufficient provision for infrastructure for water supply, wastewater and flood risk and coastal change management.

2.2 Legislation

Environment Act 2021

2.2.1. The Environment Act 2021 provides a legal framework for environmental governance in the UK bringing in measures for improvement of the environment including for water. The Act is relevant to the Water Cycle Study (WCS) process as it:

- Places a duty on water companies to secure a reduction in adverse impacts of discharges from storm overflows on the environment; growth proposed in Local Plans significantly influences how these reductions can be achieved.
- Makes drainage and sewerage planning a statutory duty through the requirement for water companies to produce Drainage and Wastewater Management Plans.
- Enables the revocation or variation of permanent abstraction licences where the change is necessary to protect the environment or where the licence is consistently underused; this may affect water available to service proposed growth.

2.3 Local Policy

2.3.1. As described above, the NPPF is a key national policy informing WCS; however, the following local policy has also been considered. The adopted Castle Point Local Plan (1998)[2] currently provides the

[1] Ministry of Housing, Communities & Local Government (Dec 2024) National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf [Accessed December 2025]
[2] Castle Point Borough Council Local Plan. Available at: https://www.castlepoint.gov.uk/adopted-local-plan [Accessed December 2025]

policy framework for sustainable development within CPBC. The policies relevant to the wastewater capacity assessment are summarised here:

- Policy EC4 – Pollution development which would have a significant adverse effect on health, the natural environment, or general amenity by reason of releases of pollutant to water, land or air, or by reason of noise, dust, vibration, light or heat will be refused.

2.3.2. A new Castle Point Plan is currently being developed to guide development in Castle Point up until 2043. This will replace the 1998 Adopted Local Plan and will provide a framework to inform decision making.

2.4 Other strategies and plans

2.4.1. The key strategies or other relevant regulatory strategies or plans which relate to wastewater capacity in CPBC include but are not limited to:

- Integrated Plan for Delivering Clean and Plentiful Water (DEFRA, 2023).
- Environmental Improvement Plan 2023 (DEFRA, 2023).
- Drainage and Wastewater Management Plan (DWMP) (Anglian, 2025)[3].
- Revised Draft Water Resource Management Plan (WRMP) 24 Technical Document Demand Forecast (Anglian 2023)[4].
- Essex & Suffolk Water Water Resources Management Plan 2024[5].

3. Growth proposals and study area

3.1 Study area

3.1.1. The wastewater capacity assessment study area is based on the administrative boundary of Castle Point as displayed in Appendix A, Figure 1.

3.2 Growth proposal summary

3.2.1. CPBC provided both a spreadsheet and shapefile of both housing allocations and broad locations including dwelling numbers on 28th November 2025, which represented the delivery of 6,196 houses over the plan period (2026 to 2043). The areas of growth were largely split across 4 settlement areas.

- Canvey Island
- Benfleet
- Hadleigh
- Thundersley

3.2.2. The total housing number includes a number of sites, totalling 480 dwellings, that have already been granted planning permission. It is assumed that any capacity issues with these dwellings have already been assessed and any issues raised to Anglian Water. Consequently, these existing commitments have not been considered as part of this assessment. The total housing number also includes 173 dwellings at Thorney Bay Park on Canvey Island which will be replacements of caravans to park homes. These fall under the Caravans Act and therefore outside the standard planning system. Consequently, these dwellings have not been included as part of the assessment. Lastly, a number of windfall sites, totalling

[3] Anglian DWMP. Available at: https://www.anglianwater.co.uk/siteassets/household/about-us/dwmp/dwmp-1.pdf [Accessed December 2025]
[4] Anglian Water Revised Draft WRMP 24 Technical Document. Available at: https://www.anglianwater.co.uk/siteassets/household/about-us/wrmp/rdwrmp24-demand-forecast-technical-supporting-document.pdf [Accessed December 2025]
[5] Essex and Suffolk Water Water Resources Management Plan. Available at: https://www.nwg.co.uk/globalassets/wrmp/nwg/october-24/esw/esw-wrmp24-main-report_final-oct-24.pdf [Accessed December 2025]

675 dwellings, have been included in the total housing number. The exact locations of these windfall sites are unknown at this stage and therefore these have not been considered as part of this assessment. Therefore, with the removal of the existing commitments, windfall sites and dwellings at Thorney Bay Park, the total number of dwellings to be assessed in this wastewater capacity assessment is 4,868.

3.2.3. Growth numbers to be used in the capacity calculations have only been provided for CPBC. Therefore, the resulting capacity of Rayleigh East and Southend WRC do not include allocated dwellings from neighbouring local authority areas. The catchment area of these WRCs is displayed in Appendix A, Figure 2 and shows that a significant proportion of the catchment areas of Rayleigh East and Southend WRC lie outside of the CPBC boundary.

4. Wastewater Services

CPBC is served by four main WRCs: Canvey Island WRC, Southend WRC, Benfleet WRC and Rayleigh East WRC. These process, treat and return wastewater from housing and non-residential sources safely back to the water environment. The WRCs are operated by Anglian Water Services (AWS) and serve the developments within CPBC. Following treatment, the treated effluent from Benfleet and Canvey Island WRCs is discharged to the River Thames. The Southend WRC discharges to the Prittle Brook and Rayleigh East WRC discharges to the Noblesgreen Ditch.

4.1 Wastewater planning

4.1.1. AWS undertake long-term planning of wastewater assets via the production of a five-yearly DWMP. The DWMP sets out risks and solutions for wastewater asset management over a 25-year planning period.

4.1.2. AWS published their current DWMP[6] in May 2023. The DWMP identifies existing risks to a series of planning objectives linked to capacity of the wastewater network and treatment capacity at WRCs.

4.1.3. Canvey Island WRC and Benfleet WRC are within the South Essex Catchment Partnership. The DWMP suggests a long term plan (2050) of 10% surface water removal for Canvey Island WRC and 25% infiltration reduction for Benfleet WRC.

4.1.4. Southend WRC and Rayleigh East WRC lie within the Essex Rivers Catchment Partnership. For Raleigh East the DWMP advises a Sustainable Drainage Systems (SuDS) solution for medium term planning and 10% surface water removal as part of its long term plans. For Southend, AWS are looking to increase the network capacity medium term and 25% infiltration reduction long term.

5. WRC capacity assessment methodology

An increase in residential and employment growth will have a corresponding increase in the volume and flow of wastewater generated within the study area, therefore it is essential to consider whether the WRC's in the study area could accept this additional wastewater flow. WRC capacity is considered in terms of flow capacity and environmental capacity.

5.1 Determining Flow Capacity

5.1.1. The flow (or treatment headroom) capacity of a WRC is defined as the volume of additional flow that a WRC can treat before it would exceed the volume of discharge it is allowed to discharge within the conditions of its discharge permit. A key condition set in each permit issued is a maximum amount of

[6] Anglian Water (2023) Drainage and Wastewater Management Plan. Available at: https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drainage-wastewater-management-plan/ (Accessed May 2025)

flow that a WRC can discharge in a day. This is measured using a metric called 'Dry Weather Flow' (DWF).

5.1.2. WRCs are required to monitor the flow discharged from each WRC and then calculate this as a 'measured DWF' value to demonstrate it is in compliance with the maximum flow condition in the permit (called 'permitted DWF'). The permitted DWF value therefore dictates how much capacity a WRC has based on the difference between what DWF it is actually discharging (measured DWF) and how much it is allowed (permitted DWF) to discharge per day. The difference between measured and permitted DWF can be calculated as a flow capacity (in m^3/d), and also converted into a 'dwelling capacity' by calculating how much flow each new dwelling would be expected to generate on average.

5.1.3. For the dwelling capacity assessment, the permitted DWF for each WRC in the council's area was provided by AWS, as well as the measured flow (2020 – 2024) for each WRC. For the purposes of this assessment, the measured Q_{80}[7] flow has been used to represent measured DWF.

5.1.4. To convert WRC DWF capacity (measured as flow capacity) into dwelling capacity relies on assumptions for the future occupancy rate of new dwellings and assumed water consumption by occupiers (per capita consumption, or PCC) of new dwellings to determine how much future wastewater flow will be generated. The future occupancy rate estimate used in the assessment was taken from Essex and Suffolk Water WRMP. Data regarding the future water consumption was taken from the preferred plan within the Essex and Suffolk Water (ESW) Water Resources Management Plan 2024[5] (October 2024).

5.1.5. Using the consumption per new domestic property values, the future occupancy rate and allowing for infiltration, the wastewater flow per new property was calculated.

5.1.6. The flow capacity of the WRCs in the CPBC study area have been considered based on the spatial distribution and scale of allocated sites. This assessment was the first step to determine both flow capacity and which WRCs may require further water quality assessment.

5.1.7. A WRC flow headroom calculator was developed and used to inform this assessment. The calculator identified which WRC within the study area will receive future growth based on allocation sites and broad locations provided by CPBC, as shown in Appendix A, Figure 1.

5.1.8. The permitted flow headroom capacity within an existing permit is assumed to be usable; therefore, the following steps were applied to calculate approximately how much available headroom each WRC has:

1. Obtain the permitted DWF and measured DWF for each WRC;
2. Determine the quantity of growth within a WRC catchment to determine the additional flow expected at each WRC;
3. Calculate the additional wastewater flow generated at each WRC;
4. Calculate the remaining permitted flow headroom at each WRC;
5. Determine whether the growth can be accommodated within existing headroom.

5.1.9. To visually represent the results, a map has been produced (see Appendix A, Figure 2) based on the WRC capacity after growth, classified with colours to reflect the relative capacity of the WRCs. The drainage catchment of each WRC has been presented on the maps to allow the council to visually understand how WRC capacity relates to spatial growth options. The colour classification works as follows:

- **Blue**, capacity remaining greater than 10% - there is more than 10% of the permitted capacity left at the WRC. There is some capacity to accept growth without major WRC upgrades or permit change.
- **Amber**, capacity remaining is 10% or less - use of the remaining capacity is likely to require WRC upgrades.
- **Red**, no capacity - growth would trigger the need for a new discharge permit and possible/likely WRC upgrades.

[7] Q_{80} is defined as the daily flow volume exceeded by 80% of measurements over a year.

5.2 Environmental Capacity - Water Quality Risk Assessment

5.2.1. Environmental capacity is defined as the water quality needed in the receiving waterbodies to maintain the current (and future required) conditions of aquatic environments.

5.2.2. As well as flow limit condition, environmental permits for WRCs may also include limits on the quality of the treated water that can be discharged. These conditions are expressed as a concentration limit for various potentially polluting substances. These are set for substances or parameters which need to be controlled to meet environmental standards in the receiving water body.

5.2.3. For the water quality risk assessment, the current permit conditions for three key parameters were provided by AWS on 12th December 2025: BOD (mg/l), Ammonia (mg/l) and Phosphorus (mg/l). The value assigned to current conditions on permits for these three parameters indicate how much more intensively WRC flows can be treated. This is because there is a limit to how far concentrations for certain parameters can be lowered before the treatment technologies needed to meet those stricter standards becomes technically unachievable or disproportionately expensive to maintain. These limits on concentration values are referred to as Technically Achievable Limits (TAL). Therefore, if an existing permit already has a condition for parameter set at a concentration which is at (or close) to the TAL for that parameter, there is unlikely to be much scope for further discharge volume from that WRC because improvements in treatment processes to achieve a stricter standard are unlikely to be feasible.

5.2.4. Using the existing permits for BOD, Ammonia and Phosphorus (where available) a classification of High Risk, Medium Risk or Low Risk for each WRC was carried out as follows:

- **High Risk**: if the current permit for BOD is 6 mg/l or less, for Ammonia is 1.5 mg/l or less and for Phosphorus is 0.5 mg/l or less.
- **Medium Risk**: if the current permit for BOD is 10 mg/l or less (but greater than 6), for Ammonia is 5 mg/l or less (but greater than 1.5) and for Phosphorus is 4 mg/l or less (but greater than 0.5).
- **Low Risk**: if none of the above apply.

5.2.5. In more simplistic terms, the ratings broadly mean:

- **High** – the watercourse which receives the treated discharge is sensitive when considering the volume of the discharge relative to the size of the river and has limited capacity to accept additional pollutant load – a new permit to discharge is likely to require quality conditions close to (or greater than) TAL hence there is potential that:
  - a solution may not be possible,
  - not all growth can be accepted,
  - significant improvements are likely to be required at the WRC which may severely restrict early phasing (potentially beyond 2030).
- **Medium** - the watercourse which receives the treated discharge has some sensitivity – a new permit to discharge is likely to need some degree of WRC improvement which is likely to affect early phasing (up to 2030).
- **Low** - the receiving watercourse has a lower sensitivity, and generally there is scope to improve the discharge without getting close to the TAL – some upgrades may be required, but it is likely they can be delivered relatively quickly.

5.2.6. It should be noted that these water quality risk ratings apply if dwelling numbers to be directed towards a WRC catchment are likely to exceed the remaining dwelling capacity as identified at each WRC. It should also be noted that this assessment is high level and does not replace the need for river modelling which may be required as part of a full WCS. It should only be used as an initial guide to relative risk, as level of actual risk cannot be known until the modelling process is undertaken.

5.3 Assumptions and Input data

5.3.1. Several key assumptions were used in the assessments as follows:

- Total number of dwellings assessed in this wastewater capacity assessment is 4,868. This doesn't include dwellings that have already been granted planning permission (existing commitments), Thorney Bay Park dwellings and windfall sites.
- This assessment has only assessed growth numbers for CPBC. Therefore, the resulting capacity of Rayleigh East WRC and Southend WRC have not included allocated dwellings from neighbouring local authority areas.
- The wastewater generation per new household was based on an assumed Occupancy Rate (OR) of 2.62 people per house and an average consumption of 110 l/h/d), both figures based on ESW Water Resources Management Plan 2024[5] (October 2024).
- Employment numbers are uncertain, therefore an allowance for future employment has been based on a 10% increase in water demand per household.
- The dwelling capacity assessment requires an estimate of water which would enter the drainage network via groundwater or water in the soil (called 'infiltration') as this uses available treatment capacity. A global assumption has been applied whereby a percentage of the water used by new dwellings would be added to as infiltration once in the sewer network to allow for this aspect. The infiltration percentage was set to 25% of water used based on information provided by AWS.
- The WRC current/measured discharge flows were taken as the Q_{80}[7] of measured flow to give the DWF assumption. Measured flows were provided by AWS in 2025 (using the 5 years of data 2020 to 2024). Future discharge flows at the WRC were calculated by adding the volume of additional wastewater generated by new dwellings and employment (using an OR of 2.62 and a consumption value of 110l/h/d multiplied by 1.208) to the current permitted DWF value.

6. Results and Discussion

6.1 Overview

6.1.1. This section presents the assessment of wastewater infrastructure capacity taking into account the scale and spatial pattern of preferred site allocations. It considers the following aspects of wastewater infrastructure:

- The capacity of WRCs to be able to accommodate additional wastewater from growth without impacting on the water environment.
- Connectivity of proposed site allocations to existing wastewater network – this identifies challenges with how site allocations can be connected to existing sewers, including operation of storm overflows.

6.2 WRC Dwelling Capacity

6.2.1. As presented in Table 1, Benfleet WRC, Canvey Island WRC, Rayleigh East WRC and Southend WRC are all shown to have over 10% remaining capacity after growth, as outlined in Section 3.2.2. These WRCs would have sufficient flow capacity within their existing permit to accommodate the level of proposed growth and would have greater than 10% of the permitted capacity remaining after growth is connected. Growth at these WRCs does not represent a significant infrastructure barrier. These results are shown visually in Appendix A, Figure 2.

[8] 10% for employment, and 10% for infiltration

Table 1. Headroom capacity assessment summary

Water Recycling Centres	Total dwelling numbers assessed	DWF Permitted flow (m3/d)	Current measured DWF (Q80) (m3/d)	Headroom Capacity pre-growth (m3/d)	Post growth DWF estimate (m3/d)	Headroom Capacity post-growth (m3/d)	Percentage capacity after growth
Benfleet	428	6,970	4393.7	2,576	4,560	2,410	35%
Canvey Island	3,143	13,000	7942.6	5,057	9,162	3,838	30%
Rayleigh East	0	4,600	3162.2	1,438	3,162	1,438	31%
Southend	1,297	60,000	49737.4	10,263	50,241	9,759	16%

6.2.2. Benfleet WRC serves the area of Benfleet and South Benfleet. A total of 428 dwellings are proposed to be constructed within the catchment of Benfleet WRC by the end of the plan period. The WRC currently has a large headroom capacity in its permit (37% capacity remaining) which means there is sufficient headroom to serve the proposed growth without requiring WRC upgrades. The WRC would have 35% capacity remaining by the end of the Plan period. No detailed water quality modelling is therefore required.

6.2.3. Canvey Island WRC serves the settlement of Canvey Island. A total of 3,143 dwellings are proposed to be constructed within the catchment of Canvey Island WRC by the end of the plan period. 943 would be from an allocation within the new plan and 2,200 from broad locations. The WRC currently has a large headroom capacity in its permit (39% capacity remaining) which means there is sufficient headroom to serve the proposed growth without requiring WRC upgrades. The WRC would have 30% capacity remaining by the end of the Plan period. No detailed water quality modelling is therefore required.

6.2.4. Rayleigh East WRC serves the area to the east of Rayleigh. No development is planned within this WRC catchment for the total of the Castle Point plan period, however there could be development within neighbouring authorities. Therefore, the following conclusion is only based on proposals of growth within CPBC. The WRC currently has a large headroom capacity in its permit (31% capacity remaining) which means there is sufficient headroom to serve the existing settlement without requiring WRC upgrades. The WRC would have 31% capacity remaining by the end of the Plan period.

6.2.5. Southend WRC serves the area of Hadleigh, Leigh on Sea, Westcliff on Sea, Southend-on-Sea and Shoeburyness. A total of 1,297 dwellings are proposed to be constructed within the catchment of Southend WRC by the end of the plan period, however there could be development within neighbouring authorities. Therefore, the following conclusion is only based on proposals of growth within CPBC. The WRC currently has a large headroom capacity in its permit (17% capacity remaining) which means there is sufficient headroom to serve the proposed growth without requiring WRC upgrades. The WRC would have 16% capacity remaining by the end of the Plan period.

6.3 Water Quality Risk Assessment

6.3.1. The results of the assessment are shown in Table 2. Where no information is shown, permit information is not available.

6.3.2. All four WRCs are presenting a Low Risk, meaning that receiving watercourses are less sensitive and generally there is scope to improve the discharge without getting close to the TAL. Upgrades may be required, but it is likely they can be delivered relatively quickly depending on the scale of growth.

Table 2. Water Quality Assessment

Water Recycling Centres	BOD Permit (mg/l)	Ammonia Permit (mg/l)	Phosphorous Permit (mg/l)	Water Quality Risk
Canvey Island	25	-	-	Low Risk
Benfleet	25	20	80	Low Risk
Rayleigh East	25	12	20	Low Risk
Southend	25	-	150	Low Risk

7. Conclusion

7.1.1. CPBC is served by four main WRCs: Canvey Island WRC, Southend WRC, Benfleet WRC and Rayleigh East WRC. Future capacity at these WRCs has been assessed for future expected growth within CPBC, based on both housing allocations and broad locations which represents the delivery of 4,868 houses over the Local Plan period (2026 to 2043). These WRCs would have sufficient flow capacity within their existing permit to accommodate the level of proposed growth and would have greater than 10% of the permitted capacity remaining after growth is connected. Growth at these WRCs is unlikely to represent a significant infrastructure barrier.

7.1.2. This assessment has only assessed growth numbers for CPBC. Therefore, the resulting capacity of Rayleigh East WRC and Southend WRC have not included allocated dwellings from neighbouring local authority areas. If work is progressed to the detailed WCS stage, WRC capacity calculations for both Rayleigh East WRC and Southend WRC should include growth from neighbouring authorities.

7.1.3. In terms of water quality risk assessment, all four WRCs are presenting a Low Risk, meaning that receiving watercourses are less sensitive and generally there is scope to improve the discharge without getting close to the TAL. Upgrades may be required, but it is likely they can be delivered relatively quickly depending on the scale of growth.

Appendix A

Figure 1: Castle Point Study Area and Housing Allocations
Figure 2: WRC Catchment Capacity and Water Quality Assessment

Revision: 1 Drawn: BW Checked: RM Approved: HJ Date: 2026-01-06

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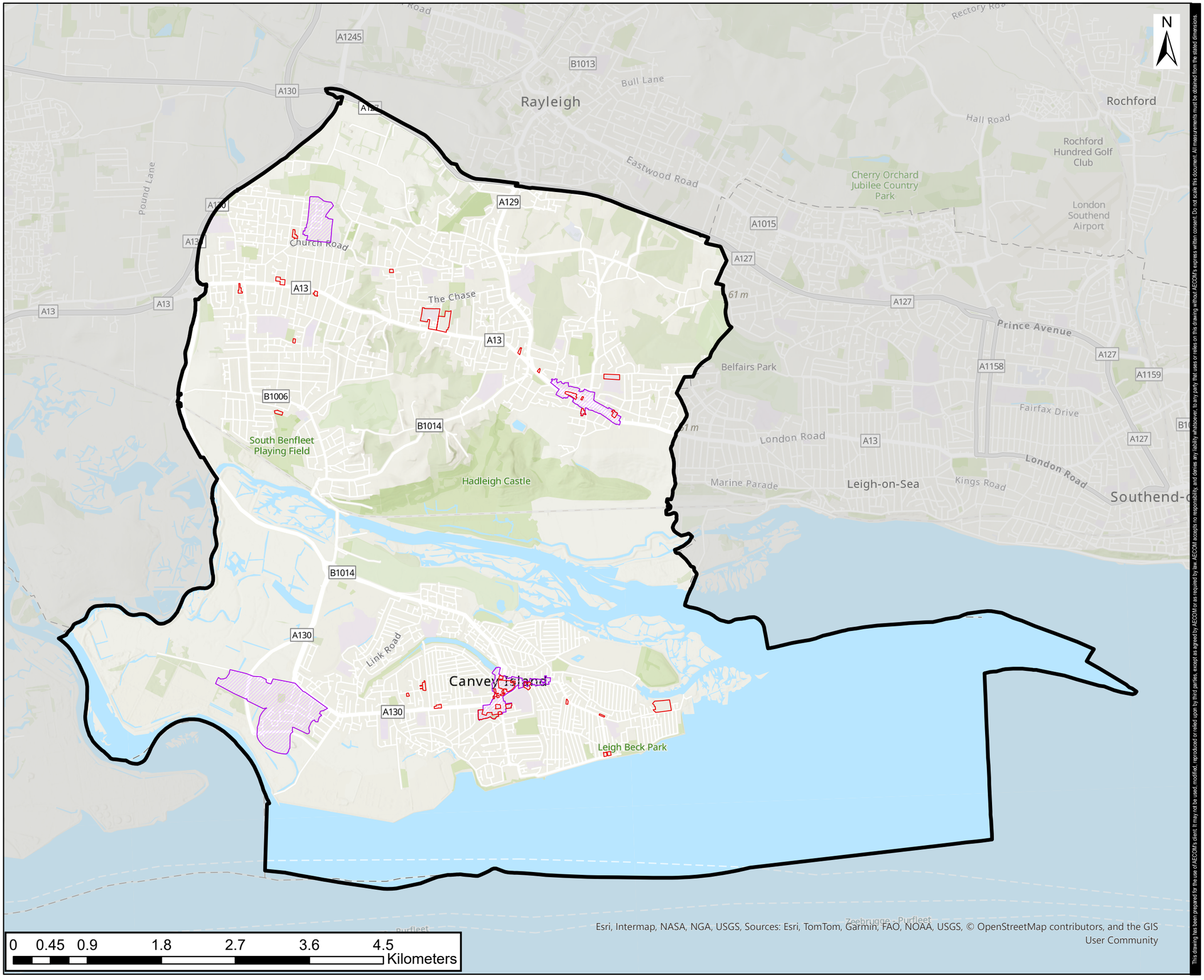

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LEGEND

- Castle Point Borough Council Boundary
- Broad Locations
- Housing Allocations

NOTES

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FIGURE TITLE

Castle Point Housing Allocations

FIGURE NUMBER

Figure 1

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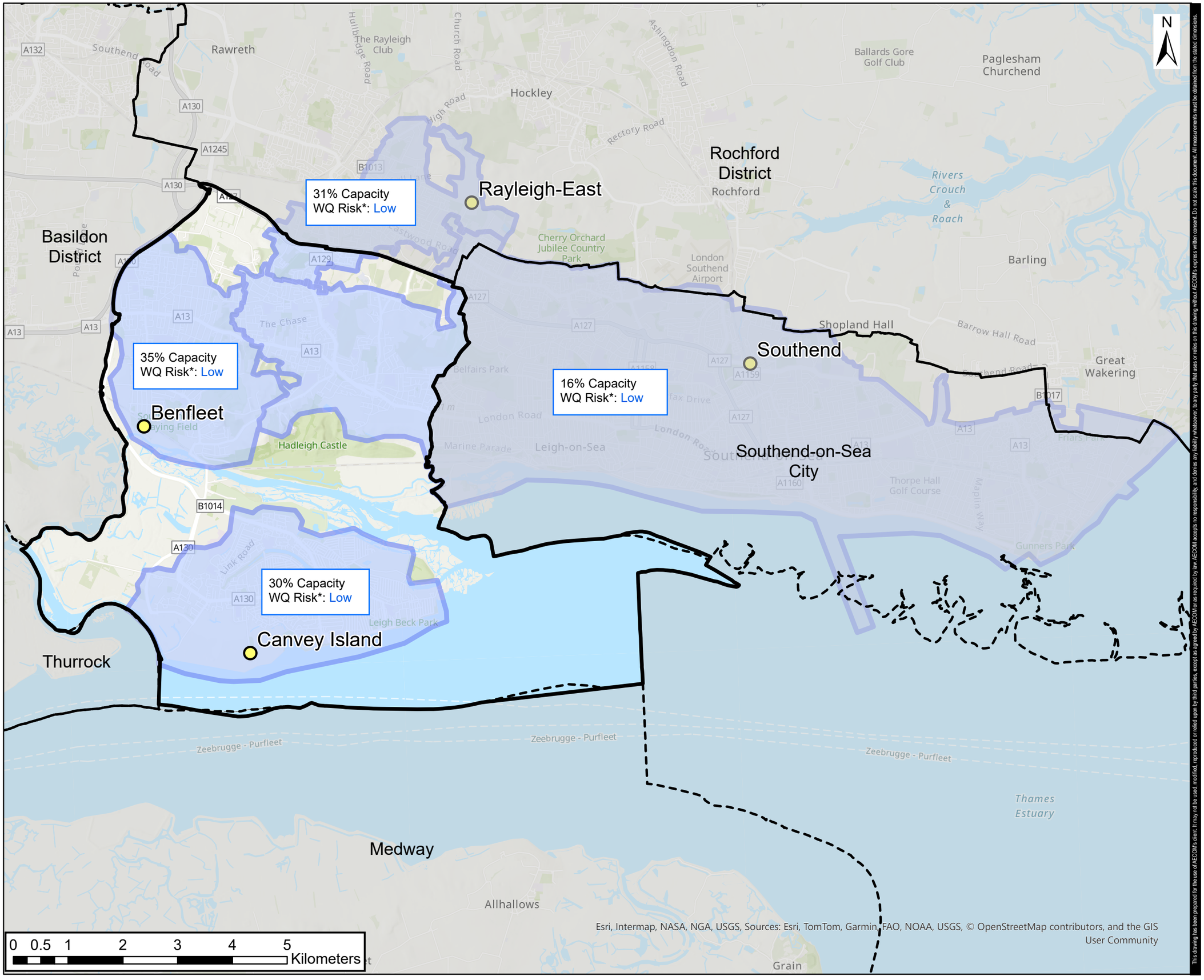

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LEGEND

WRC Catchment Capacity**
- More than 10% Capacity
- Less than 10% Capacity
- No Capacity
- Castle Point Borough Council Boundary
- WRC
- Neighbouring Local Authorities

NOTES

* Water Quality Risk Assessment
** The capacity is solely based on growth numbers within the Castle Point study area

ISSUE PURPOSE

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PROJECT NUMBER

60725540

FIGURE TITLE

WRC Catchment Capacity and Water Quality Assessment

FIGURE NUMBER

Figure 2