OTTERPOOL PARK

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APPLICATION DOCUMENT | 3.20

UTILITIES DELIVERY STRATEGY

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ARCADIS

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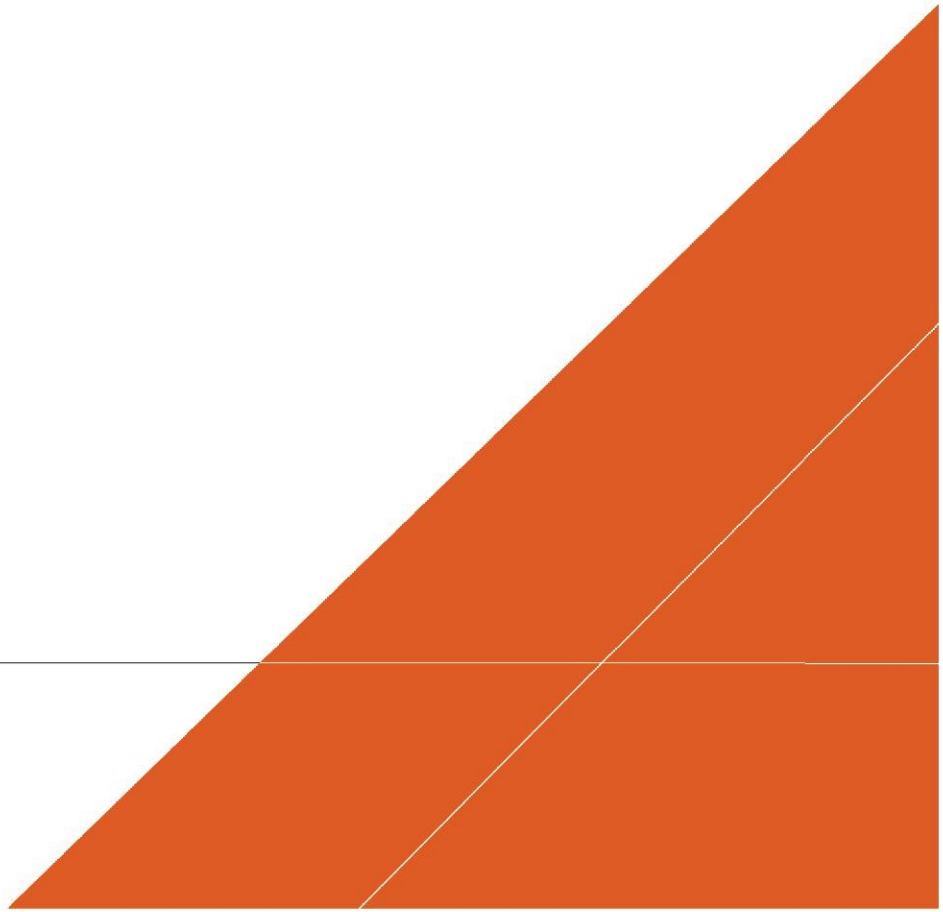
OTTERPOOL PARK

Utility Delivery Strategy

FEBRUARY 2019



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1 Introduction

1.1.1 This Utility Delivery Strategy for Otterpool Park has been prepared by Arcadis to accompany an outline planning application by Cozumel Estates Ltd ('the applicant') to FHDC as local planning authority for the development for Otterpool Park Garden Settlement.

1.1.2 Decisions on how the Otterpool Park development will be provided with key utility infrastructure needs to be carefully planned. The delivery strategy must reflect policy and legislation, best practice, consider the existing utility infrastructure provision, statutory authority timescales, but then balance these issues against the practicalities of cost and operation for all residents and non-residential occupiers and the strategy for achieving this aspiration is outlined in the accompanying 'Energy Strategy'.

1.1.3 The Otterpool development is being designed to complement existing settlements. Through upgrading existing utility networks, it will increase resilience of the networks and connectivity for a wider catchment and neighbouring settlements, where there are already existing concerns about pressure on already stressed utility infrastructure, with specific requests for improving gas and broadband connectivity.

1.1.4 Traditional non-renewable sources, such as gas, have not been ruled out for Otterpool Park, but complications with lengthy delivery timeframes by the provider and emerging Government policy pushing for more renewable power technologies for cleaner air, will need to be overcome throughout the planning process for this utility to be viable.

1.1.5 All too frequently, the implementation of utility infrastructure is delivered on a piecemeal basis. For Otterpool Park, it is important to develop more strategic or 'holistic' solutions which support the accompanying Energy Strategy and help deliver the wider benefits to both new and existing communities.

1.1.6 The procurement strategy for the utilities provision is still to be finalised, but extensive negotiations have already been carried out with the five main incumbent utility providers (gas, electricity, water supply, waste water and broadband) to confirm the solution options. The incumbent providers are the duty holders responsible for provision of a utility within a particular region.

1.1.7 Timelines and phasing of wider network upgrades are also still being determined, but generally, the network reinforcement requirements and points of connection are now generally known and understood for all utilities. The likely network reinforcement and utility connection costs have also been explored, in an effort to alleviate commercial risk and drive value for the new development.

1.1.8 Arcadis has conducted a review of the current utility issues to determine the status of current onsite and offsite utility infrastructure at Otterpool Park. A number of buried services are located within the Otterpool Park site boundary along with connections to the existing buildings of neighbouring villages. Costs associated with the early removal and diversion of the existing services traversing the site will need to be explored as the plans for the development progress, but the primary focus of this utility delivery strategy is to explore the utility connection options and the network reinforcement requirements, in an effort to alleviate commercial risk and public concerns and drive value for the new development.

1.1.9 This Utility Delivery Strategy sets out several viable options for each utility service, which offers a mix and match selection of traditional Statutory Utility supplies, together with private inset network service options for broadband/communication, gas, electricity, water supply and waste water treatment.

2 Utility Requirements

Otterpool Park Development Criteria

2.1.1 The development proposal, subject to Outline Planning Approval, is for the construction of a new residential development accommodating the following:

- 8,500 homes
- 82,418sqm of employment
- 8,250sqm of leisure
- 28,875sqm of retail
- 7,701sqm hotel
- 37,161sqm of education
- 20,900sqm of community facilities

2.1.2 The residential build-out (circa 325 residential units per annum in the first three years rising to 400 and 450 thereafter) assures a mix of unit types and includes for both normal private dwellings, affordable housing and specialist housing types such as residential homes for the elderly etc. In addition, retail, employment and education will be developed alongside the residential build-out programme. The timeframe for the scheme is to be on site 2020/21 for initial infrastructure works, including utilities, with first housing occupation in early 2022.

2.1.3 Build-out of the development is anticipated to commence simultaneously in both the north-east (Development Zone 1A) and central portions of the site (Development Zone 1B) adjacent to and around the railway station area and then, southern areas, finally western areas.

2.1.4 There is a general issue of water shortages in the south east so, the development aspiration will look for considerable reductions on consumption of potable water for domestic properties, from 126 l/person/day to nearer 90-100 l/person/day. To enable achievement of the ambitious potable water consumption target, water recycling initiatives will be incorporated to facilitate recycled non-potable water re-use within the Otterpool Park development.

2.1.5 There is very little in the way of gas infrastructure in the area, with many neighbouring communities opting for duel fuel through use of refillable cylinder gas. Without a gas supply, there will be a significant increase in electrical demand from electric heating and vehicles than a traditional development of this size. Many properties are likely to support infrastructure for electric vehicle charging and will incorporate smart energy storage solutions to reduce demand from the electricity grid.

2.1.6 Existing neighbouring settlements have concerns over the quality and speeds of the existing broadband telecommunication offering, but it has been established that the common supply in the area is through fixed line broadband that isn't fibre optic. The development aspiration is to provide a high speed or superfast broadband network to Otterpool Park.

2.2 Potable Water

Existing provision

2.2.1 The incumbent water utility provider for the area is Affinity Water (AW). A new potable water supply will be required from AW to serve the new development. The existing water infrastructure records are appended in **Appendix A1**. In general, there is an existing potable water network within the development sufficiently sized for the existing demand and with immediate additional capacity for the early phases of development. A new water main will need to be constructed between the development and Paddlesworth Reservoir, over a length of approximately 11Km. The water main will follow the same alignment as an existing water main, rather than upsizing the existing main.

2.2.2 There is a general issue of water shortages in the south east so, the development aspiration will look for considerable reductions on consumption for domestic properties. AW has recently undertaken their water resourcing review for their south east region and the future demand from Otterpool was factored in to this. It has been confirmed that there are sufficient water resources available in the Folkestone/Dover region to serve the 8,500-unit development without detriment to the existing catchment. Although, this will require some offsite improvements to existing infrastructure.

2.2.3 As part of Affinity Waters initial water resourcing review, it has been confirmed that there is existing capacity support the first 1,500 units. Affinity Waters' assumptions are based on circa 400 litres per household/day; or 126 l/person/day. However, it is likely that the development aspiration will look for considerable reductions on this figure, potentially nearer 90-100 l/person/day (250 litres per household/day) and thus, a greater number than the anticipated 1500 units can be served before the reinforcement infrastructure is needed.

2.2.4 Any other development plans in the area between now and making a connection application for Otterpool, may utilise this existing spare capacity. To mitigate this risk, enquiries have been made to see if/how this capacity can be ringfenced in any way, in anticipation of the construction phase starting in 2021. Until a formal application is made for the potable water connections, the adequate water resources currently advised by Affinity Water are theoretical, but the likelihood of water resource being reallocated is considered to be very low.

Development Demand

2.2.5 Affinity Water has confirmed that it is possible to supply the first 1,500 units from the existing network, and that it is purely down to the limitations of the existing main network that prevents any further units being connected. The remaining 7,000 units of the development will require upgrades to the sizing of the existing offsite and onsite mains to ensure sufficient water pressure is achieved and maintained between the reservoir and the development and neighbouring settlements.

2.2.6 The quantum of water required to serve the development is not a cause of concern for Affinity Water at this time.

Potable Water Solution

2.2.7 Affinity Water has confirmed that, a dedicated 560mm diameter water main would be required between the development and Paddlesworth Reservoir, over a length of approximately 11Km. The water main will follow the same alignment as the existing water main, which will serve the first 1,500 units. The route of this new water main is shown in **Appendix A2** and it will need to cross both the HS1 rail and the M20 road infrastructure.

2.2.8 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.

2.2.9 In order to reduce the amount of offsite mains needed for the Otterpool Development, Affinity Water will need to reconfigure the offsite network to suit.

2.2.10 The full length of the 11km water main will not need to be in place until 1,501st occupation (or later if the lower consumption is achieved) and as such, AW has confirmed the following infrastructure phasing strategy to serve the full development:

1. The first 1500 properties can be provided by the existing system. By utilising the spare capacity, a dedicated water main would not need to be in place until 2024 assuming an onsite construction start date in 2021 with a build rate of 350-450 units per annum.
2. The next Phase of work will involve the construction of a new pipeline from Paddlesworth Reservoir up to and beyond the HS1 crossing and the M20 (although the actual crossings could come later) to release capacity for a significant number of properties, currently estimated at 6,000.
3. The final phases of the works will be to complete the reinforcement around the crossings and tie in with one of AW higher pressure mains including carrying-out local reconfiguration of the network to release capacity for up to 10,000 properties

2.2.11 Significant design work and network modelling is required before Affinity Water is able to estimate the potential cost and delivery timeframes, 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.

2.2.12 The indicative implementation programme from the start of planning through to construction completion is 4-5 years to allow for the two crossings of strategic infrastructure.

2.2.13 Ofwat has revised the way that Infrastructure Contributions are calculated for all new connections and subsequently invested by the water undertakers and these new rules are expected to be in place at the beginning of 2020. The new water main is classified as a 'site specific off site main' and according to Affinity Water charging rules, a 10% offset contribution is required from the Developer, but this will be confirmed upon formal application for the water connections post-planning approval.

Potable Water Reinforcement Requirement

2.2.14 A formal Section 41 (Water Main) application will be completed post-planning approval to commence the new water main requisition process. Otterpool is classed as an 'extraordinary' development as it is in excess of 500 units. Due to the Otterpool development being classed as 'extraordinary' Affinity Water has 42 calendar days to respond with the design solution following the formal application.

2.2.15 There are a number of masterplan design changes that can impact upon the delivery of the water main design produced by Affinity Water under a Section 41 application. These include:

- change of point of entry to the site
- overall water demand (i.e. number of units)
- the layout of the mains on site.
- phasing of the development

2.2.16 If any of the above design changes occur, then a new Section 41 application will need to be made.

2.3 Electricity

Existing Provision

2.3.1 The existing electrical power network is owned and managed by the statutory supplier, UK Power Networks (UKPN). Existing electrical power infrastructure records are appended in **Appendix A3** and these show an existing large UKPN Grid Substation located northeast of the site, in Sellindge. There are a number of smaller package substations throughout the development area, but they are only suitable to meet existing local demand and have limited spare capacity.

2.3.2 Negotiations are ongoing with UKPN, but it has been confirmed that an upgrade at Sellindge Grid Substation will be required for Otterpool to be supplied with electricity via a new primary substation, to be built on the site.

Development Demand

2.3.3 With the Government announcement to ban the sale of gasoline and diesel cars from 2040, electrical vehicle charging points will be incorporated into the development. The shift to electric vehicles will be a gradual one, but the additional power requirement for vehicle charging has been factored into the utility delivery strategy.

2.3.4 The Electrical Vehicle strategy for Otterpool Park will include a combination of domestic and public charging points. Trials will be undertaken in the initial phases of the development to test options and commercial arrangements to ensure the chosen solutions are steered towards the optimum destination. Three types of charging currently exist:

- Slow: Up to a 3kW supply used for overnight charging (6-12 hours) – Domestic mains single phase supply;
- Fast Chargers: Around 7kW -22kW supply for faster charge (3-4 hours) – Domestic mains 3-phase supply; and
- Rapid Chargers: From 43 -50kW (although some charger now 150kW) supply rapid charge (30 min charge) – Public and communal parking areas

2.3.5 The electrical load calculations contained in **Appendix A4** include allowances and a diversified load factor for electric vehicle charging and assumes that 20% of properties will charge an electric vehicle at the same time.

Network Capacity

2.3.6 UKPN has confirmed the availability of 3MVA supply in the nearby 11kV electricity network, 2MVA in the west and 1MVA to the east which, combined would serve around 650 properties if served by natural gas heating (dual fuel) and facilitate the simultaneous build-out of Development Zones 1A and 1B. Two package substations will be required, one in Development Zone 1A and the other in Development Zone 1B in order to connect into the existing 11kV network.

2.3.7 UKPN has also confirmed that power from the 11kV network, to the new homes (up to, but not including the meter) will incur infrastructure connection costs of circa £1000 per unit (£8.5million), a cost which, is already allowed for as an on-plot build cost. These are indicative costs at this stage and will be subject to a formal application post-planning approval, but confidence can be placed in the figures from UKPN for the 11kV supply.

2.3.8 Although there would still be risks associated with abnormal costs, the cost of providing the electricity connections to Otterpool Park should be allowed for within the build cost allowance, for a serviced site. The reinforcement works will be an additional cost to the build cost and can only be determined following further engagement with UKPN.

2.3.9 For occupations beyond the 651st unit, the power network will need a significant reinforcement upgrade which, is now broadly understood, but the costs and timeframes are still being determined by UKPN.

Electrical Power Solution

2.3.10 The reinforcement upgrade requires a new on-site primary substation within the Otterpool redline boundary, to cater for the full development. A location for this substation has been identified on the masterplan, and this will be provided on currently owned land, adjacent to the Otterpool Lane/A20 road junction.

2.3.11 The new primary substation will either be connected to UKPNs 33kV or 132kV networks, to serve the entire development and would be capable of supplying a further 60MVA to the 3MVA capacity already available in the 11kV network which, even under an all-electric power and heat scenario, would be more than sufficient for a Settlement of this size.

2.3.12 The further 60MVA power load requested of UKPN is in excess of what the development will require, but affords resilience in the event that gas is not brought to the new development. Energy consumption will be monitored in the early phases and if the aspiration for reduced energy demand is realised, UKPN will review and reassign load to the wider network.

2.3.13 UKPN has confirmed that, minor off-site reinforcement works will be undertaken by UKPN at Sellindge Grid substation with upgrades to the existing circuitry. This upgrade will facilitate connections from Sellindge to the new onsite primary sub-station. The more complicated 132kV connection option will require the modification of two Pylons located within the Otterpool development redline boundary to accommodate two 132kV underground cables for connection to the new onsite primary sub-station. The particulars of this connection option is not yet confirmed by UKPN at the time of writing.

2.3.14 UKPN has since determined that the 132kV option will be significantly higher cost and complicated to deliver than connecting the development to the 33kV network and advised on 30th November in a budget quotation that, the non-contestable works, has been based on the 33kV solution and not the 132kV solution as originally anticipated. UKPN is obligated to provide the minimum cost option to Developers and as such, UKPNs Design Review Panel rejected the 132kV proposal in favour of the 33kV solution. However, there are significant benefits for proceeding with the higher cost 132kV option, namely the removal of a potential directional drilled cable crossing under both the M20 and HS1 major infrastructure, located to the north of the site. Although a financially viable solution has been determined, the decision by UKPN's Design Review Panel means that, if the 132kV solution is to be pursued, the lengthy timeframes have been reset for a further application to be placed to specifically focus on the 132kV option.

2.3.15 A separate budget quotation application has since been requested for the 132kV option to enable a comparison of the costs and better inform the preferred option for the point of connection to the contestable works i.e. the onsite primary substation and beyond. The budget quotation for the 132kV option is due on 21st January 2019. UKPN has confirmed that the cost difference between the two options can be met by the developer with mutual agreement through exchange of letters.

2.3.16 With the upgrades and connection to either the 132kV or 33kV grid network, the primary substation will take the form of a 30-metre x 40-metre compound, containing the voltage transforming and switching infrastructure required for the primary substation to transform the power voltage from 132kV or 33kV, down to 11kV and will supply power to the circa 60no. small 1MVA package substations which, will serve the individual development parcels.

2.3.17 The package substations will be provided in various locations throughout the development, linked by 11kV cable ring main, to supply power, in a lower voltage, to the individual development parcels. The actual number will be dependent on power demand as the build-out progresses and as such, will be delivered in a sequential, phased approach.

2.3.18 The works between the UKPN Grid substation and the point of connection for the primary substation are 'non-contestable works' which, requires the work to be undertaken and procured through UKPN as it affects and alters their highly sensitive asset. The works from the point of connection, including the construction of the primary substation, secondary 11kV network package substations and cable laying to the individual development plots, are 'contestable' works. These contestable works allow any adequately qualified and licenced organisation to deliver the development power infrastructure within the redline boundary.

2.3.19 A typical delivery timescale can vary from 2 - 4 years from placement of order and will be dependent upon the final procurement strategy and the use of incumbent providers, Independent Distribution Network

Operators (IDNO) or Musco operators. The timeframe for delivery of the permanent solution accords with the development build-out programme due to the availability of 3MVA capacity within the existing 11kV network, which is sufficient capacity for 2-years post-commencement with duel fuel supply. The grid-substation reinforcement and new primary substation will need to be in place by 2023 to cater for occupations beyond the 651st unit if gas is not delivered to the development.

2.4 Gas

2.4.1 **Existing provision**

2.4.2 Southern Gas Networks (SGN) is the incumbent gas supplier for this area. The existing gas infrastructure records are appended in **Appendix A5** which, shows little in the way of gas infrastructure in the immediate surrounding area. SGN has stated they do not have the capability to serve a development of this scale from the existing network without significant and lengthy upstream reinforcement to the Intermediate Pressure network.

Development Demand

2.4.3 The decision as to whether a gas network is delivered to Otterpool Park requires careful consideration. On the one hand, Folkestone & Hythe District Council is very much aware of the difficulties that existing neighbourhoods face with a lack of gas infrastructure. On the other hand, they are also mindful that investing and delivering such non-renewable infrastructure for Otterpool could be short lived and thus, could potentially offer a poor investment for the future residents.

2.4.4 The limited existing gas supply network has forced a change in our utility strategy approach and a mainly electric development energy supply is now being considered as a preferred option. The key issue for the gas is the timeframe for completion of the reinforcement works.

2.4.5 The peak gas demand for 1,000 units split on a 70%/30% houses to flats would require peak gas demand of 5,418 kW. This is based on no diversity in heating, but diversity in the domestic hot water demand for homes and the hotel.

Development Solution

2.4.6 SGN has confirmed that connection to the development can be made from the existing network. However, a budget quotation for a proposed development of 12,000 homes (far greater than the current masterplan), dated February 2018 revealed that, significant network reinforcement will be required to serve the proposed development as there is no immediate gas infrastructure capable of serving the full development in the vicinity.

2.4.7 The point of connection for the full development has been confirmed by SGN to be the Intermediate Pressure (IP) network, but this is a considerable distance from the site, in West Hythe. A new gas main will need to be laid between the point of connection and a new gas governor at the southern portion of the site, near to Aldington Road/Otterpool Lane. From here, the gas pressure will be converted from Intermediate pressure (IP) to low pressure (LP) which can then be distributed between the gas governor and Development Zones 1A and 1B via new low pressure gas mains.

2.4.8 The provision of gas at Otterpool would still have a vital role to play, particularly in the early phases whilst the larger and more time-consuming electricity network upgrades are carried out by UKPN, but it would also offer resilience to the electricity network and comfort to UKPN that the maximum capacity of the new onsite primary substation would not be reached. Phase 1 of the development is therefore being treated as a mini-project to cover the first build units only (Development Zones 1A, 1B and 1C).

2.4.9 An enquiry was made for 2,300 units (Phase 1) to be connected and SGN determined that the point of connection would still be in West Hythe and that significant reinforcement would still be required for a reduced number of units. Upon this news, a further enquiry has since been placed for a lesser amount, 1,000 units. SGN confirmed in a budget quotation letter on 5th November 2018 that, a low pressure (LP) gas supply can be provided for the first 1,000 residential units. The point of connection for the LP network is near Berwick Farm, immediately to the East of the site. Some reinforcement of the LP network will be required, but at a much reduced lead-in period of 700 days from placement of order. So, part of Phase 1 could be dual fuel for power and heating with minor reinforcement of the existing SGN gas network. With the current build rate forecast, the 700-day lead in for SGN's gas reinforcement would be completed before the first unit is ready for occupation.

2.4.10 Beyond 1000 units, the alternative Intermediate Pressure network reinforcement would need to be in place to serve the full development. The 2,010 day lead-in period for these works would result in a 12-month gap between 1000th occupation and the next unit being connected to gas with the envisaged build-out rate. So, beyond 1000 units the development would need to move to an all-electric energy supply either temporarily or permanently, as detailed in Section 2.3 above.

2.4.11 Through de-regulation and market competition an approved contractor could be procured to supply gas to the development to drive value. GTC has been approached to provide a quotation in addition to the supply of electricity and fibre broadband, but at the time of writing, GTC has been unable to improve upon the information and offer already received from SGN.

2.4.12 Otterpool Park can be connected to gas, but SGN has advised that network reinforcement could take as much as 6-years to implement for the full development. SGN has advised that any costs associated with reinforcement of the network will need to be met by the Developer. The nature of required reinforcement can only be determined through undertaking a full design study, at the cost of the Developer, and only once the masterplan has been fixed i.e. post-planning permission approval.

2.4.13 The current strategy will bring gas to the development for the first 1000 units. With the Governments Green Agenda and push for gas to be phased out of future developments, gas from the intermediate pressure network remains a viable option, but even under an all-electric power and heat scenario, the primary substation would be more than sufficient for a Settlement of this size to be all-electric. The decision whether to bring gas infrastructure into the full development will require further design and environmental considerations post-planning determination.

2.5 Waste Water

Existing provision

2.5.1 The waste water treatment incumbent supplier for this area is Southern Water. The waste water treatment infrastructure can be supplied by Southern Water. The existing waste water infrastructure records are appended in **Appendix A6**. In summary, the existing area is serviced with a network of small diameter drainage and series of small-scale pumping stations which transfer flows to Sellindge Waste-water Treatment Works (WWTW).

2.5.2 There are existing operational Southern Water waste water assets on the site that, serve the wider catchment and Arcadis has explored the potential to use this existing infrastructure in relation to the phasing of the development. However, significant lengths of the existing rising mains and gravity network will need to be diverted to facilitate development build-out, as much of this existing infrastructure currently sterilises developable land.

2.5.3 The nearest Waste-water treatment works is located at Sellindge, to the north of the HS1 railway line. Southern Water has advised that Sellindge WWTW has headroom for circa 875 units before a significant upgrade will be required to accommodate the additional flows from the development, but the required upgrades are still possible within the boundary of land owned by Southern Water at Sellindge.

2.5.4 The nearest pumping station to Development Zones 1A and 1B is currently located on the existing racecourse within Southern Water owned land, within the redline boundary extent. The existing racecourse pumping station is connected to the Sellindge WWTW facility 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 existing adopted highway, into Sellindge WWTW. This pumping station was previously confirmed as the initial point of connection for the development.

Point of Connection and Available Capacity

2.5.5 Initially, Southern Water advised that there could be sufficient capacity within the existing network to cater for the first phases of development with minor upgrades to the Racecourse pumping station and upsizing of sewers and mains to provide additional storage. However, Southern Water confirmed in a recent meeting (10th January 2019) that, Sellindge WTW can accommodate an additional 325 properties without upgrades if the point of connection was changed to Grove Bridge pumping station.

2.5.6 The racecourse pumping station takes flows from the existing wider catchment and Southern Water has undertaken preliminary surveys and modelling of their existing network and have confirmed that, zero capacity is left at this pumping station. A greater understanding of the existing racecourse pumping station capacity has revealed that this pumping station is not suitable or capable of being upgraded to accommodate the early waste water flows from the first phases of the development. Southern Water already has several upstream nearby flooding incidents and substantial surcharge flooding will happen if Phase 1A is connected. Two existing pumps are currently operating continuously, and two rising mains are also in poor condition. Consequently, this pumping station will not be the initial point of connection for Otterpool. Instead, Grove Bridge pumping station is now the point of connection.

2.5.7 Grove Bridge pumping station is also connected to the WWTW facility 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 existing adopted highway, into Sellindge WWTW.

2.5.8 As the available capacity at Grove Bridge pumping station is limited to 325 properties (max) it would only be sufficient for year-one of first build. Development Zones 1A and 1B can be connected, but only in the short term and so, the permanent solution will need to be implemented in phase 1, at least in part.

2.5.9 In order for the first 325 units to be connected to the existing network, a new temporary length of rising main will be required between a new pumping station near Development Zone 1B (WPS2) at the Otterpool Lane/A20 junction and Grove Bridge pumping station, but it will become redundant after the first 325 units are occupied. The temporary rising main can either traverse across the field (Phase 7); or, it can be laid in the footway or carriageway of the A20 over a much shorter distance of approximately 1Km.

2.5.10 For occupations beyond the 326th residential unit ether the permanent solution has to be implemented; or the connecting sewerage infrastructure north of Grove Bridge pumping station will first need some upgrading involving upsizing of offsite gravity sewers and rising mains, but the reality is that, Sellindge WWTW only has headroom for a total of 875 units before a significant upgrade will be required to accommodate the additional flows from the development. can be connected in the interim solution without causing upstream and downstream flooding.

2.5.11 The permanent solution will therefore need to be implemented either before the 326th occupation or 876th occupation depending on the extent of upgrades commissioned on the existing network and thus, a more holistic solution for the phasing of the waste-water infrastructure has to be developed in accordance with the build-out programme.

Development Demand

2.5.12 The topography of the site creates three distinct catchments where each catchment will require a new permanent pumping station to transfer flows onwards for treatment and disposal. The flows and storage required at each pumping station are provided in the table below, extracted from the accompanying 'Water Cycle Study'.

SPS	Design Flow (l/s)	Min Sump Depth (m)	Local Catchment Emergency Storage (m^3)	Cumulative Emergency Storage (m^3)	Est. Rising Main Dia. (mm)
PS1	70	5.1	484	484	300
PS2A	27	6.1	189	189	200
PS4	67	8.2	463	463	250
PS2	214	7.2	344	1479	450
PS3	247	4.3	227	1707	500

2.5.13 These pumping stations will be linked by a series of new rising main and gravity sewer networks to distribute the waste water flows from the various phases of the development to a common point before being discharged to Sellindge WWTW for treatment using a new Terminal pumping station (PS3) referred to in the accompanying 'Outline Water Cycle Study'. Initially, two pumping stations are proposed in the vicinity of Development Zone 1Aand 1B, respectively, to facilitate build-out commencement of the early phases in lieu of the later land drawdowns which, enable the permanent network to be constructed.

2.5.14 The underlying principal of the waste-water strategy is for flows from the east of the development to be transported to the western extremity of the development to be discharged into either, the watercourse; or, directly to Sellindge WwTW or an onsite WwTW. All interlinking sewer and rising main infrastructure will follow the alignment of the Green Corridor which, is planned to be implemented in years 0-5 on the development. The Green Corridor is shown on the development phasing plan '7a. 16034(P)211C 0-5y 23-10-18'.

2.5.15 Southern Water has also advised that significant offsite reinforcement will be required to connect the development to the Southern Water network, but the capacity of the existing offsite Southern Water network remains unknown and further investigation is being undertaken by Southern Water in the form of an Impact Study. In order for them to provide a full scope and fee quotation, the results of the Impact Study are required. The Impact Study will analyse the current racecourse pumping station and the receiving gravity network but will take up to six months to complete. The study will fully model the existing network, assess the impact of the development and determine options for increasing the capacity to cope with the load from the new development matching the currently proposed build rates. The results and details of a reinforcement solution are not expected until March 2019.

2.5.16 There is then the additional complexity to resolve, whereby Southern Water has to provide a return pipe from Sellindge WWTW into the development for the supply of recycled black water for re-use in irrigation and toilet flushing to meet the 90 l/person/day target. The provision of recycled for re-use is a key requirement as it will be critical to reducing the consumption and reliance upon the potable water supply and on-plot water efficiency measures and will assist in the achievement of the aspiration for a potable water domestic consumption target of 90 l/person/day.

2.5.17 Southern Water has confirmed the capability to return recycled water to the development for re-use, but route of the return pipe, the timing for delivery, the quality of water and treatment process to be adopted and cost charging mechanism requires further discussion and agreement.

Waste Water Solution Option 1 - Southern Water Sellindge WWTW

2.5.18 Southern Water has identified a solution that involves upgrading Sellindge WWTW which, would accommodate the full development load and future proof the wider catchment network in the process. It has been confirmed by Southern Water that, the cost of the upgrade at Sellindge will be met by Southern Water in consideration of the future revenue from the development connection charges.

2.5.19 The main challenge of this option is the need to determine the most efficient method of discharging the development waste water flows to Sellindge WWTW without the need for significant and prohibitive upgrades and reinforcement of existing mains running through surrounding settlements and under the HS1 railway and M20 motorway. Determining a solution for serving the short-medium term phases of development plan without impacting the preferred long-term WWTW solution implementation will not be fully known until March 2019.

2.5.20 Whilst there is a 'Right to Connect' for domestic properties into the nearest waste water network, subject to granting of planning permission, and a point of connection has been advised (a gravity sewer to the Racecourse pumping station), there is only a limited amount of available capacity in this existing network and Southern Water has advised that, connecting any more than 20-30 new domestic properties would impact neighbouring settlements with both upstream and downstream flooding.

2.5.21 The responsibility for upgrading the network to accommodate the new domestic properties does fall to Southern Water in this situation, but anything other than domestic property does not have the same rights to connect and as such, this adds a greater level of complexity to the overall solution. In phase 1, a significant portion of education, retail, employment, community and leisure facilities will be delivered and connections to the waste water network for these uses would more than likely be met with refusal by Southern Water without requisitioning the required offsite reinforcement and upgrades.

2.5.22 Depending on the final build strategy and phasing of the development, there may be sufficient capacity within the existing network to cater for the first phases of development with minor upgrades to the racecourse pumping station and upsizing of sewers and mains to provide additional storage and there is an option to requisition Southern Water to undertake a particular element of improvement works to expedite the process, but at the cost of the developer. Thus, allowing any issues in respect of a final solution to be dealt with upon planning permission approval.

2.5.23 A quotation is currently being sought from Southern Water as well as ongoing design discussions to establish if there is potential capacity through advanced minor upgrades in the existing network for early phases.

2.5.24 There is a further option to work collaboratively with Southern Water, to determine the most efficient solution for Otterpool, to develop a solution that takes the existing wider catchment through the Otterpool Park development via the new pumping station infrastructure and transferring flows to Sellindge via a new rising main connection between pumping station 3 and Sellindge WWTW, but along the northern boundary of the site, and into Sellindge WWTW from the south, rather than the existing route to Sellindge WWTW from the north, already in place. The option 1 waste water solution layout is appended in **Appendix A7**.

2.5.25 The collaborative approach option will likely require a directionally drilled utility crossing under the HS1 railway, or conversely, an over-bridged utility crossing into the southern portion of Sellindge, rather than entering from the north. In taking the wider catchment flows through Otterpool, the pumping stations, rising mains and gravity sewers would provide Southern Water with non-development specific infrastructure that increases capacity and resilience of their network and future proofs their asset to accommodate growth in the wider catchment areas. The pumping stations, rising mains and gravity sewers will be offered up to Southern Water for adoption in any case so, in this scenario, the cost of the pumping stations would be subject to the same charging arrangement as the upgrade at Sellindge i.e. Southern Water cost, or at the very least, match funded by Southern Water.

2.5.26 In connecting the development to the racecourse pumping station in the interim solution, it would require additional storage volume to be provided in the form of underground tanks / wells and an upgrade of the existing pumps themselves.

2.5.27 Pumping station 1 would need to be built in Development Zone 1A for both the interim and permanent solution, rather than upgrading of the existing SW racecourse pumping station, due to land boundary limitations. The interim solution aims to use the existing network (with minimal reinforcement) and send flows to Sellindge WWTW facility which already has confirmed capacity for the first 875 units (with minimal intervention to the inlet structure), after which time, the Sellindge WWTW would require substantial upgrading to cater for the increased flows from Otterpool. The threshold for the interim network solution is not agreed with Southern Water as it will be dependent on the results of the Impact Study.

2.5.28 The flows from pumping station 3 would be pumped direct to SW's Sellindge WWTW. The route and location of this crossing has not been confirmed by Southern Water as yet and is part of the ongoing discussion with them. If Southern Water were able to provide a recycled water supply then, the return pipes would follow the same alignment from Sellindge back to the Otterpool site.

Waste Water Solution Option 2 - Onsite Treatment Works

2.5.29 Other alternative and innovative options have also been determined for waste water treatment and water recycling at Otterpool. One such option includes an on-site new Wastewater Treatment Works (WwTW) facility and non-potable reclaimed effluent recycling network to achieve the 90 litres of water per person, per day target, which would make the development more self-sufficient.

2.5.30 Folkestone & Hythe DC and Arcadis have begun investigations into the viability of an onsite waste water treatment solution through engagement of NAV organisations. New appointments and variations (NAVs) 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 which, is Southern Water in this case.

2.5.31 NAVs, in the same way as the incumbent provider, provide waste water connections to new developments, adopting and operating waste water infrastructure. The waste water infrastructure is adopted and operated by the NAV as part of an inset network under the Water Industry Act 1991 (as amended). This process is one that is entirely familiar to developers and follows the S104 process established in Sewers for Adoption (or S102 for existing networks).

2.5.32 Further benefits of an onsite WWTW NAV appointment would be the increased serviced offering, although Sewers for Adoption (7th edition) would enable Southern Water to provide a similar offering, organisations such as Albion Water can help to look after SUDS (swales, balancing ponds etc.) green spaces, trees, hedges and community open spaces. NAVs can do this by adopting, maintaining or working through a site management trust.

2.5.33 Onsite wastewater treatment facilities are becoming increasingly common place in new large developments although, the treatment and return of recycled black water for re-use in developments, is less common place. The additional treatment processes and additional non-potable water distribution infrastructure network required for the re-use of recycled black water is still relatively unknown and will be subject to further design and consideration before the requirements and viability are fully understood for Otterpool.

2.5.34 An onsite WWTW facility with the capability of returning recycled black water to the development for re-use in order to help achieve the 90 l/PP/D target is an attractive proposition and would certainly help deliver sustainability targets for the development. Not least because this option would be self-sufficient and bespoke for the new residents of Otterpool, but it will also provide another approach to Southern Water to deliver a timely and efficient solution.

2.5.35 The benefit of this onsite solution is that all of the infrastructure required to serve the development would be provided within the confines of the redline boundary and such a facility would remove the need to directional drill under HS1 railway. The major disbenefit for this option in comparison to the offsite solution is the significant complexity for development viability because of the substantial and potentially prohibitive upfront capital cost investment that will be required to provide such a facility at Otterpool.

2.5.36 A 100-metre x 75-metre compound will be required for the buildings and treatment infrastructure and a location for this has been identified on the Masterplan, in the north western portion of the site, to be near

the discharge outfall location on the East Stour River. This position is the most optimum for such a facility as the facility needs to be set away from new domestic properties, but near to a water course to discharge treated effluent. The position of this WWTW facility will be located some distance from the first builds planned in Development Zones 1A and 1B. Consequently, in order for the domestic property flows from 1A and 1B to reach the WWTW for treatment, all of the identified pumping stations and rising main network and gravity sewers will need to be constructed and operational prior to 1st occupation.

2.5.37 The internal catchment areas for the onsite WwTW option are largely identical to the proposals for the offsite option although, the existing Grove Bridge station would not be incorporated into the network. The option 2 waste water solution layout is appended in **Appendix A8**.

2.5.38 The flows from Development Zone 1A will gravitate into the new pump station 1 which, will then pump flows over to pump station 2. Development Zone 1B flows gravitate into pump station number 2 so, pump station 2 then pumps both the 1A and 1B flows over to an onsite WWTW for treatment (as a combination pumped of gravity networks).

2.5.39 The requisition costs for the design and construction of the onsite WWTW falls to the developer and although it can be paid in stage payments. The cost would not be required upfront however. Instead, stage payments would be made over a period of between 5 to 7 years. However, in addition to the WWTW, the developer will be required to design and construct the full pumping station network with rising mains and gravity sewers between the eastern and western extremities of the site, prior to 1st occupation. At such time that, the network is constructed and operational, the developer can offer up the pumping station network for adoption under S104 agreement to the NAV to own and manage.

2.5.40 The onsite WWTW option will cost significantly more than the Southern Water option and a significant proportion of this cost will be required soon after planning permission to guarantee the network is in place for 1st occupation. The disbenefit of this option is therefore, cashflow and the impact on development viability with such a significant capital investment before the first domestic property has been constructed and occupied. However, it presents significant benefits for water recycling and reductions in overall water usage.

2.5.41 The processes involved in the waste water treatment are understood and Albion Water can guarantee water quality to be returned to the development for re-use. Reed bed designs can also be used to further enhance or provide tertiary treatment to modular sewage treatment systems. The resulting high-quality water could then be released into the environment or stored and blended with rainwater for future treatment prior to being recycled and reused for toilet flushing and garden watering. The design and layout for the plant and similarly, the processes involved specifically for the Otterpool Park development will remain undetermined until a NAV supplier is procured and commissioned to proceed with the design work.

2.5.42 The provision of a new WwTW facility on site; or, upgrading Southern Water's existing Sellindge WWTW could enable achievement of the ambitious potable water consumption limit through return of at least 30% recycled non-potable water for re-use in park and garden irrigation and toilet flushing in domestic and non-domestic properties within the Otterpool Park development. It is for this reason that we are proposing both options are taken forwards before determining a preferred solution.

Waste Water Solution Option 3 - Southern Water West Hythe WWTW

2.5.43 A final, least preferred option is for the provision of a direct rising main connection between a new pumping station on the site and Southern Water' West Hythe WWTW. This would offer a simple solution, but the distance between the site and the West Hythe WWTW is six-kilometres. The cost impact to the Otterpool development would cover the infrastructure up to West Hythe treatment facility. This includes the pumping station(s) and the 6km length of rising main. The option 3 waste water solution layout is appended in **Appendix A9**.

2.5.44 There have been a number of meetings and workshops with Southern Water at various stages of the scheme, and based on the enquiry and the information supplied, an initial solution was proposed to connect the development via a rising main to the West Hythe treatment plant which, still remains as the worse-case option. The plant itself would require expansion, however this is not considered to be a problem by Southern Water. A rising main of approximately 6km in length, would be required and Southern Water suggested that this could follow the alignment of existing adopted road network. However, Southern Water has advised that whilst West Hythe WWTW is a potential option, the following issues make it more difficult, complex and costly compared to their Sellindge WWTW option:

- Significant distance for the transfer of flows;
- Significant potential for an Environmental Impact Assessment (EIA) related to the pipeline;
- Limited land availability within the existing site boundary;
- Treatment works served by a single pumping station (Range Road), which accommodates the preliminary treatment for the catchment prior to flow transfer to the treatment works, limited expansion capacity available at the pumping station site;
- Significant uprating of pumping capability and rising main required if Otterpool 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; and
- As there is no storage at West Hythe WwTW, the incoming flow and outgoing flows are finely balanced so, introducing additional flows directly to West Hythe will also make the management of flows more complex. Increased flows may require new/additional long sea outfall.

Preferred Solution

2.5.45 The strategy has identified three waste water solutions. Solutions one and three involve connecting to Southern Water's existing network in a traditional approach. The second solution involves constructing an onsite Waste-water Treatment Works (WWTW) within the confines of the site boundary.

2.5.46 The strategy currently recommends the traditional offsite approach as the preferred solution (option 1) as there are existing operational Southern Water waste water assets on the site and a nearby WWTW that, serves the wider catchment and Arcadis has explored the potential to maximise the use of this existing infrastructure in relation to the phasing of the development. A collaborative joined-up approach to the wider waste-water treatment and network solution would have a positive impact on the surrounding wider catchment to future proof demand and thereby increase future resilience. However, other innovative solutions for waste water treatment that bypass the incumbent supplier will continue to be explored.

2.5.47 The intention has not been to arrive at a single preferred solution prior to submission of the planning application as there is still a significant amount of uncertainty and considerable design work to be undertaken to inform the viability and delivery phasing of the infrastructure for each solution identified in the strategy. Discussions and negotiations are ongoing with both Southern Water and a number of other NAV suppliers with the capability of providing an onsite WWTW solution, to establish the most optimum permanent solution. The offsite (option 1) and onsite (option 2) are both viable options and these will be developed further post-planning determination.

2.6 Telecommunications

2.6.1 Delivering a fast, efficient and well-connected telecommunications network is a key principle for Otterpool Park. It will be an important consideration for business wishing to locate here and extending high speed/superfast broadband to Otterpool will also facilitate improved connectivity potential for the wider catchment and immediate neighbouring settlements such as Lympne, Newingreen and Aldington, where there are already existing issues with broadband speeds and connectivity.

2.6.2 The potential telecommunication suppliers for Otterpool Park are less restrictive than other utilities. The existing telecommunication infrastructure records are appended in **Appendix A10**.

2.6.3 BT Openreach and Virgin Media have advised that there is no barrier to maximum broadband speeds that could be achieved at Otterpool Park. It would be down to individual consumers/businesses to ask for an exceptional service and therefore pay for that service. Openreach supply all the required ducts, chambers and fibre cable, but cost implication will arise from upgrading existing supply (to provide wider benefit to adjoining settlements), trenches, reinstatement and diverting any existing Openreach apparatus on the site.

2.6.4 Existing neighbouring settlements have concerns over the quality and speeds of the existing offering, but it has been established that the common supply in the area is through fixed line broadband that isn't fibre optic, but instead, is called ADSL (asymmetric digital subscriber line). With ADSL, data is sent through the traditional copper phone lines all the way from the exchange, and it's usually available with average speeds of 17Mb, but we are aware that end users currently struggle to achieve download speeds of greater than 3Mb.

2.6.5 The aspiration is to provide a high speed or superfast broadband network to Otterpool Park. Fibre-to-the-cabinet (FTTC) is the most common setup for fibre broadband. Fibre cables run from the exchange to the cabinet at the point of connection, which then connects to the individual properties via a copper phone line. This is the kind of fibre broadband that is obtainable for Openreach-based providers, including BT, Sky, TalkTalk, Plusnet, Vodafone and EE.

2.6.6 Generally, fibre broadband is available with average speeds of 35Mb, 57Mb or 63Mb, though some providers can offer packages with average speeds of 350Mb and above or even 1Gb (1,000Mb).

2.6.7 Fibre-to-the-home (FTTH), meanwhile, means the entire line is fibre from the exchange all the way into the building. It allows for even faster speeds but is not widely available and can be very difficult and expensive to install. However, FTTH is the proposed service for Otterpool Park.

2.6.8 BT Openreach has confirmed the nearest exchange is in Sellindge (postcode TN25 6JY) and that, the extension of the network from the exchange into the development will be free of charge and that capacity for broadband, within the existing BT Openreach network, is readily available for the full development. The programme for the extension of the fibre network will be determined upon a formal application post-planning approval, but wider benefits will be realised by the existing local community struggling with high speed connections. The route from the exchange to Otterpool will navigate through existing surrounding villages and will therefore offer greater potential for the neighbouring communities to connect to a high-speed broadband service.

2.6.9 Alternative broadband suppliers and Multi-Utility Service Companies (MUSCos) such as GTC, TriConnex and Energetics, could also offer an alternative connection solution and this option needs further investigation.

2.6.10 GTC has initially been approached for a budget quotation and has since confirmed that, fibre optic broadband can be provided to the development for nil-cost and a rebate on each connection made in consideration of the future revenue from the end users. The budget quotation covers the first 2,300 properties as an additional utility service provision to the electricity supply.

2.6.11 At the time of writing, a budget quotation for the full development is awaited from GTC. Although, it is anticipated that the same charging mechanism will apply i.e. nil cost and a rebate for the connections in consideration of the future revenue from the end users.

3 Conclusion

3.1.1 The advice contained within this Utility Delivery Strategy report has focussed on the utilities services to support and de-risk the Otterpool Park development.

3.1.2 Arcadis has conducted a review of the current utility issues, to determine the status of current onsite and offsite utility infrastructure at Otterpool Park. A number of buried services are currently located within the site boundary along with connections to the existing residential properties. Options have been determined for the early removal of the base dependent infrastructure, through engagement with the statutory utility providers and utility service providers.

3.1.3 It has been assumed, for the purpose of this study, that the proposed development would be served in a cost-effective way, through use of the existing statutory utility networks to enhance the viability of the site at no extra cost to the baseline.

3.1.4 Arcadis is confident that Otterpool Park will have adequate connections to utilities, with supplies of water, electricity and high-speed telecommunications confirmed as available on day one of the build out. A point of connection and supply of gas has been confirmed for the first 1000 units, but even under an all-electric power and heat scenario, the primary substation would be more than sufficient for a Settlement of this size to be all-electric. The waste-water solution needs further refinement post-planning determination, but both the onsite and offsite solutions proposed are viable and deliverable within the timeframes required for 326th occupation.

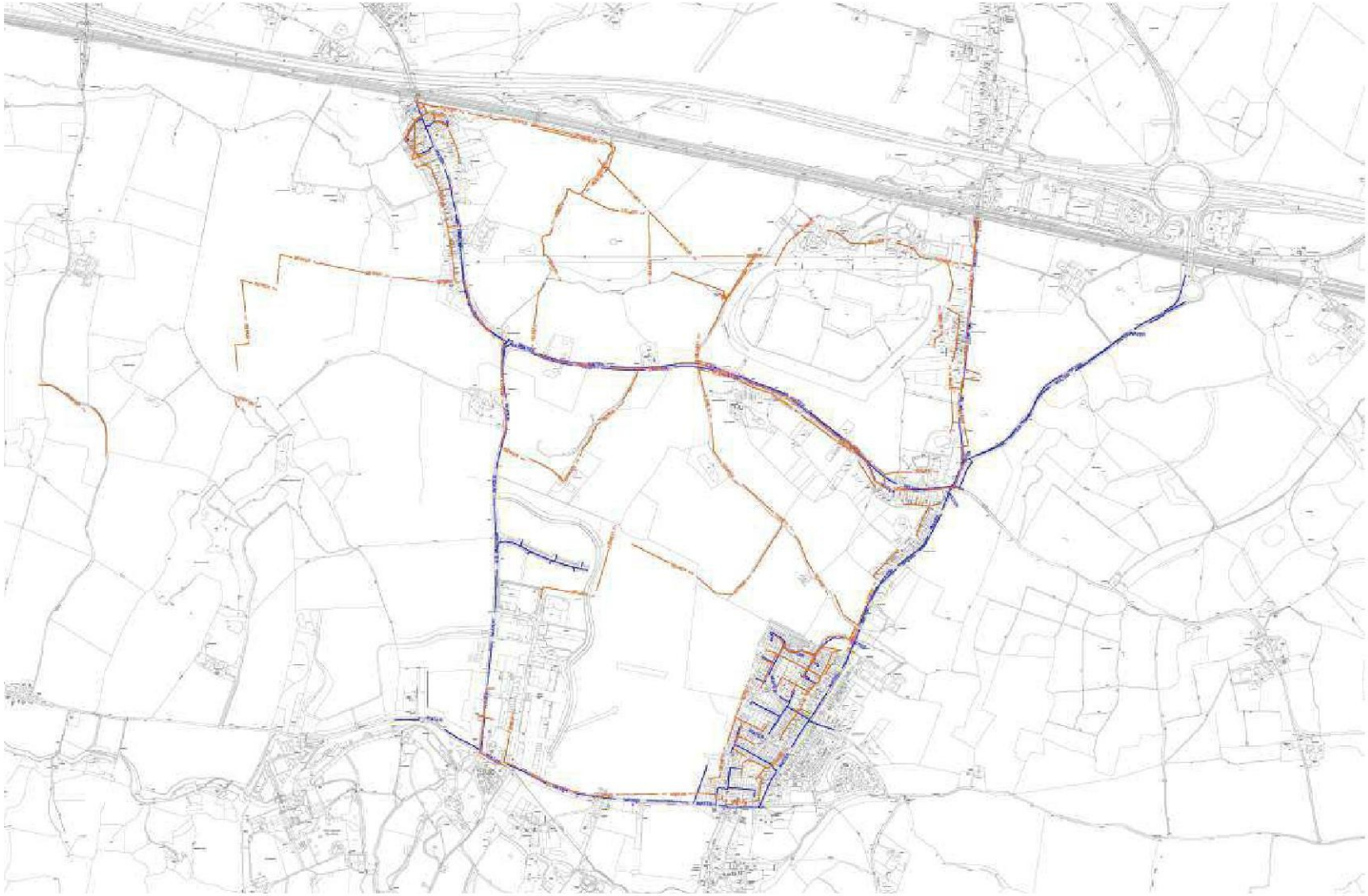
3.1.5 Cost estimates have been obtained where possible, for the new connections and likely reinforcement works needed to cope with the load requirements of the new development. It could be possible to reduce these infrastructure costs further through value engineering, challenging the costs quoted by incumbent utility suppliers for delivery of the infrastructure and in turn, further de-risking the development to drive value for the project.

3.1.6 The size of the site and nature of the proposed development presents an opportunity to take advantage of the benefits that renewable infrastructure can offer. Although beyond the scope of this utility delivery study, this is being explored in the Energy Strategy, to determine whether current available technologies such as, wind turbines, Photovoltaic's (PV), solar hot water systems, ground/air source heat pumps, Biomass heating and power (CHP), would be both suitable and viable for Otterpool Park to meet the aspiration for an environmentally sustainable development.

APPENDICES

A1 – Existing Water Infrastructure Records

Appendix A1 – Existing Water Network Records (Affinity Water & Southern Water)



A2 – Route of New Potable Water Main

Potable Water Reinforcement- Otterpool Development

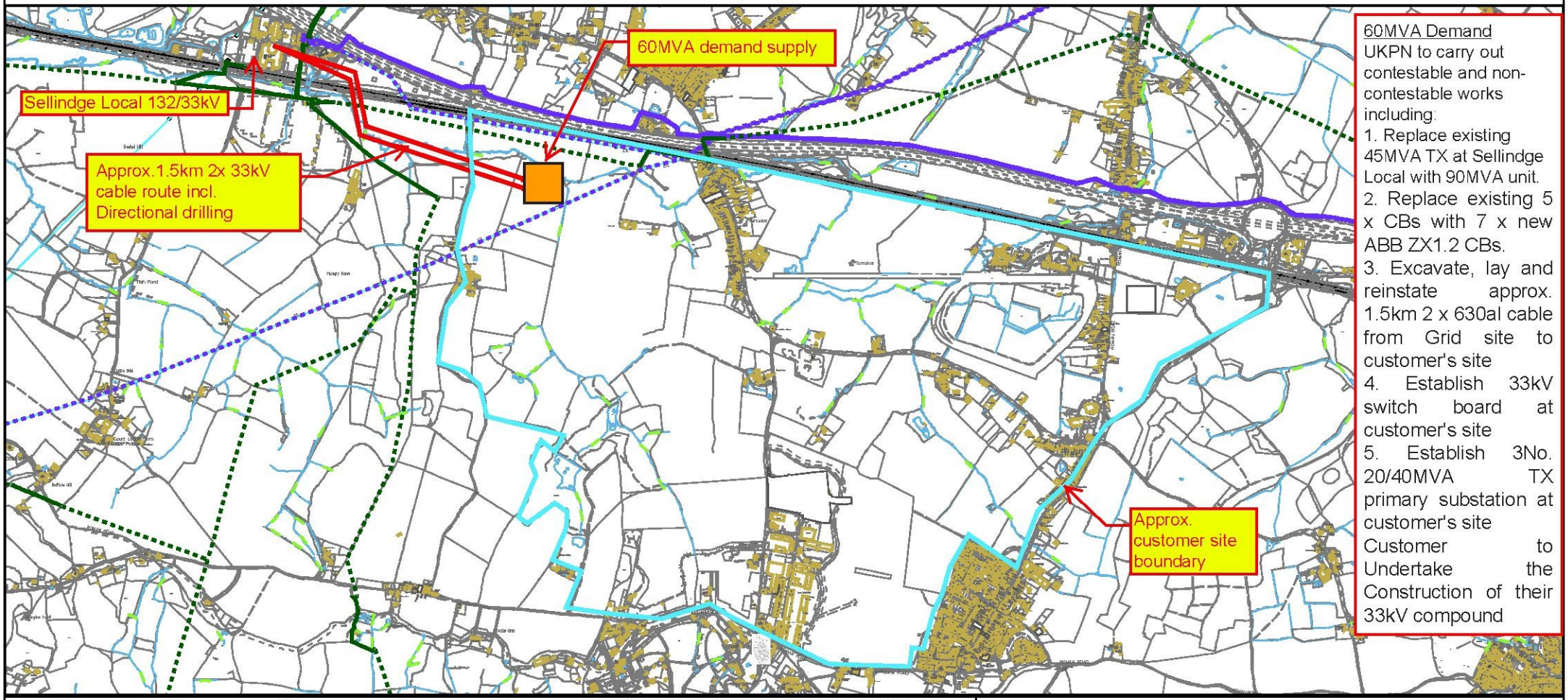
Approximately 11km of 560mm OD (494mm ID) main. Total implementation period from the start of planning through to construction completion is 4-5 years to allow for the two crossings of strategic infrastructure.

A3 – Existing Electrical Power Infrastructure Records

Title: Otterpool IDNO TN25 6DE

JOB NO: 8200022891

STANDARD PLOT



60MVA Demand

UKPN to carry out contestable and non-contestable works including:

1. Replace existing 45MVA TX at Sellindge Local with 90MVA unit.
2. Replace existing 5 x CBs with 7 x new ABB ZX1.2 CBs.
3. Excavate, lay and reinstate approx. 1.5km 2 x 630al cable from Grid site to customer's site
4. Establish 33kV switch board at customer's site
5. Establish 3No. 20/40MVA TX primary substation at customer's site

Customer to Undertake the Construction of their 33kV compound

0m 600m 1200m 1800m 2400m

The quality and accuracy of any print will depend on your printer, your computer and its print settings. Measurements scaled from this plan may not match measurements between the same points on the ground.

LV Cable or Line

HV Cable or Line

EHV Cable or Line Approx. position

Ductline

Pole & Street Furniture

Substation & Link Box

1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed.
2. The exact position of the apparatus should be verified – use approved cable avoidance tools prior to excavation using suitable hand tools.
3. It is essential that trial holes are carefully made avoiding the use of mechanical tools or picks until the exact location of all cables have been determined.
4. It must be assumed that each property and item of street furniture has an electricity supply. Service cables shown only where known.
5. All cables must be treated as being live unless proved otherwise by UK Power Networks.
6. The information provided must be given to all people working near UK Power Networks plant & equipment. Do not use plans more than 3 months after the issue date for excavation purposes.
7. Please be aware that electric cables/lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.

VISITING AN OPEN POINT? Please mark on this plan all locations visited and open points as found, then return updated map to your Business Unit – Thank You.

1. UK Power Networks does not warrant that the information provided to you is correct. You rely upon it at your own risk.
2. UK Power Networks does not exclude or limit its liability if it causes the death of any person or causes personal injury to a person where such death or personal injury is caused by its negligence.
3. Subject to paragraph 2 UK Power Networks has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise for any loss, damage, cost, claims, demands, or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever.
4. This plan has been provided to you on the basis of the terms of use set out in the covering letter that accompanies this plan. If you do not accept and/or do not understand the terms of use set out in the covering letter you must not use the plan and you must return it to the sender of the letter.
5. You are responsible for the security of the information provided to you. It must not be given, sold or made available upon payment of a fee to a third party.

Contact UK Power Networks on 0800 056 5866 for details of EHV Cable routes before commencing work.

Grid Ref: TR 11087 36668

Scale: 1:28947

(When Plotted at A4)

Plotted on: 14/08/2018

Plotted by: Akintayo Oyede

UK Power Networks

Plan Provision

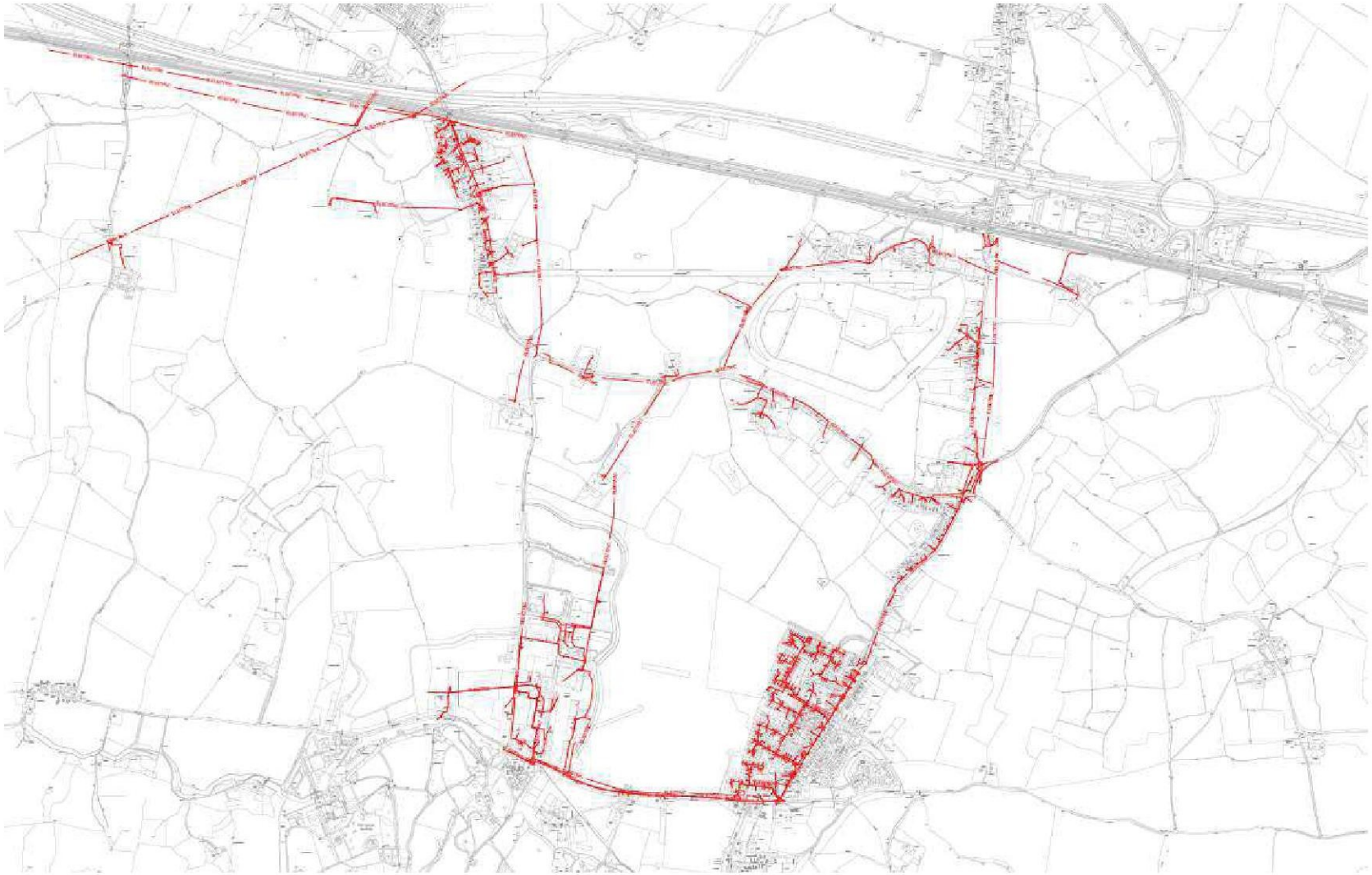
CHECK IT OUT BEFORE YOU DIG IT OUT
CALL 0800 056 5866
EMERGENCY– If you damage a cable or line
Phone 0800 096 3766 (24hrs) URGENTLY

LOOK OUT LOOK UP

ALWAYS LOOK UP BEFORE YOU START WORK
Refer to HSE Guidance note GS6

Maps produced at 1:2500 scale are LV Geo-Schematics which show LV mains cables and overhead lines (in some cases all voltages). Prior to carrying out excavations you must refer to the 1:500 records to determine the location of all known underground plant and equipment.

Appendix A3 – Existing Electrical Power Network Records (UKPN)



A4 – Electrical Load Calculations

All Electric Properties

ASSUMPTIONS		
No of properties	10,000	
Residents/ property	4	
Total residents	40,000	
Employees	9,000	based on Masterplan
Total People	49,000	
Total Non Domestic Area (GIA)	164,700	m2
ASHP COP	2.5	*Assumed Seasonal efficiency*

The calculations DO NOT take into consideration the use of battery storage and Solar PV and thermal store

Domestic				Reference
For Regulated el. purposes/ household	*0.95*	*kW*	*Elexon Class 1 Profiles*	*https://www.elexon.co.uk/operations settlement/profiling/*
For SH/ household	*1.30*	*kW*	*Elexon Class 2 Profiles (Economy 7)*	*https://www.elexon.co.uk/operations settlement/profiling/*
Combined profile - Economy 7 and el. purposes	**1.60**			
For DHW/ household	**1.00**	kW	*Diversified Based on Danish Standard for 10,000 homes*	
Total per House	**2.60**	kW		
Total Estimated Peak Load	**26,000**	**kW**		In line with http://www.esru.strath.ac.uk/EandE/Web_sites/13 14/WRISC/admd.html Report

Non Domestic				
Assumed Diversity	40%			
For Regulated el. purposes	18,225	kW	Based on CIBSE Guide F	
For SH and DHW	16,555	kW	Based on a combination of BSRIA Rule of Thumb and Arcadis' previous experience	
Total Estimated Peak Load	**13,912**	**kW**		
	Assuming that SH accounts for 80% of the peak. Calcs based on benchmarks below.			
	Benchmarks used		*SH Peak (W/m2)*	Peak Electricity Load (W/m2)
	School	*D1*	*90*	103
	Office	*B1*	*70*	87
	Retail	*A1*	*100*	160
	Restaurant	*A3*	*100*	225
	Leisure	*D2*	*75*	160

EV Charging Points				Reference
Need for charging	1	charge/ day/ EV		
Residential Charger	7	kW	Fast Charger	http://ukevse.org.uk/charge points chargers/
Commercial Charger	7	kW	Fast Charger	http://ukevse.org.uk/charge points chargers/
Employees	9,000	based on Masterplan		
Electric Cars	10%	of employees use electric cars		
No of Electric Cars	900			
Non Domestic %Usage	30%			
Non Domestic - Total Capacity	1,890	kW		
Properties	10,000			
Electric Cars	20%	of residents use electric cars		
No of EV points	2,000	across all resis		
Domestic %Usage	40%			
Domestic - Total Capacity	5,600	kW		
Total Diversified EV Capacity	**7,490**	kW		

Street Lighting				Reference
Light Rate	200	W	LED Light	
People/ Street light	15		Avearge 15 people/ street light	ttps://www.ledhut.co.uk/blog/switched on an in depth look at street lights within communities/
No of Street Lamps	3,267			
Diversity	90%			
Total Diversified Lighting Capacity	**588**	kW		

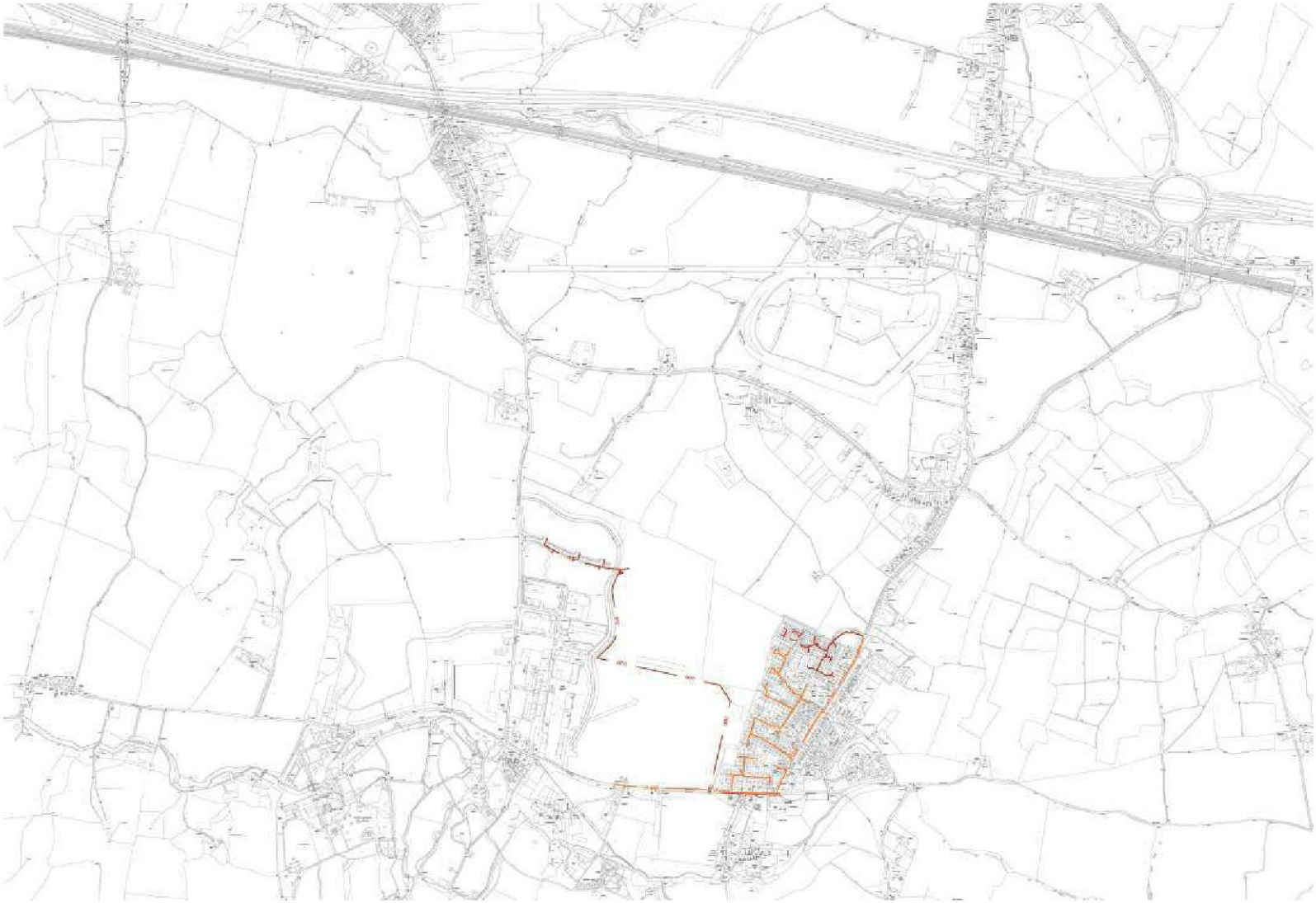
Sewage Works				Reference
	500	kW	Esimate based on Flow Rate design	Arcadis Previous Project Experience

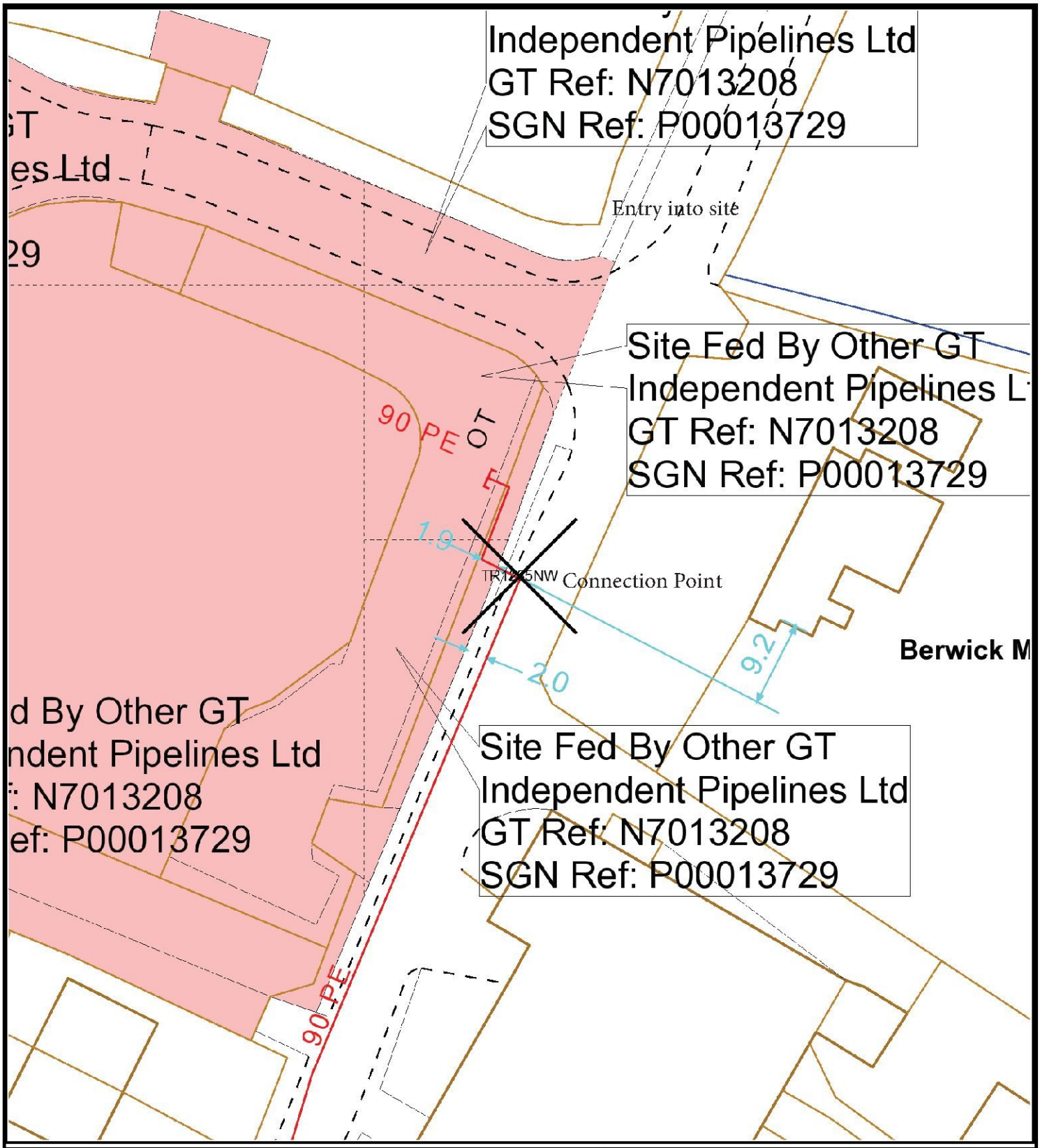
Assumed Contigency	*10%*			

TOTAL LOAD	52,789	kW		

A5 – Existing Gas Infrastructure Records

Appendix A5 – Existing Gas Network Records (SGN & GTC)





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DATE :	05/11/2018
INTERNAL USE ONLY	
GRID REFERENCE :	E612365,N135577,TR 12 35

LP MAINS
MP MAINS
IP MAINS
LHP MAINS
HISTORY DATA
LAs
GTs
SSSIs

Some examples of Plant Items
Valve | Syphon | Depth of Cover | Diameter Change | Material Change

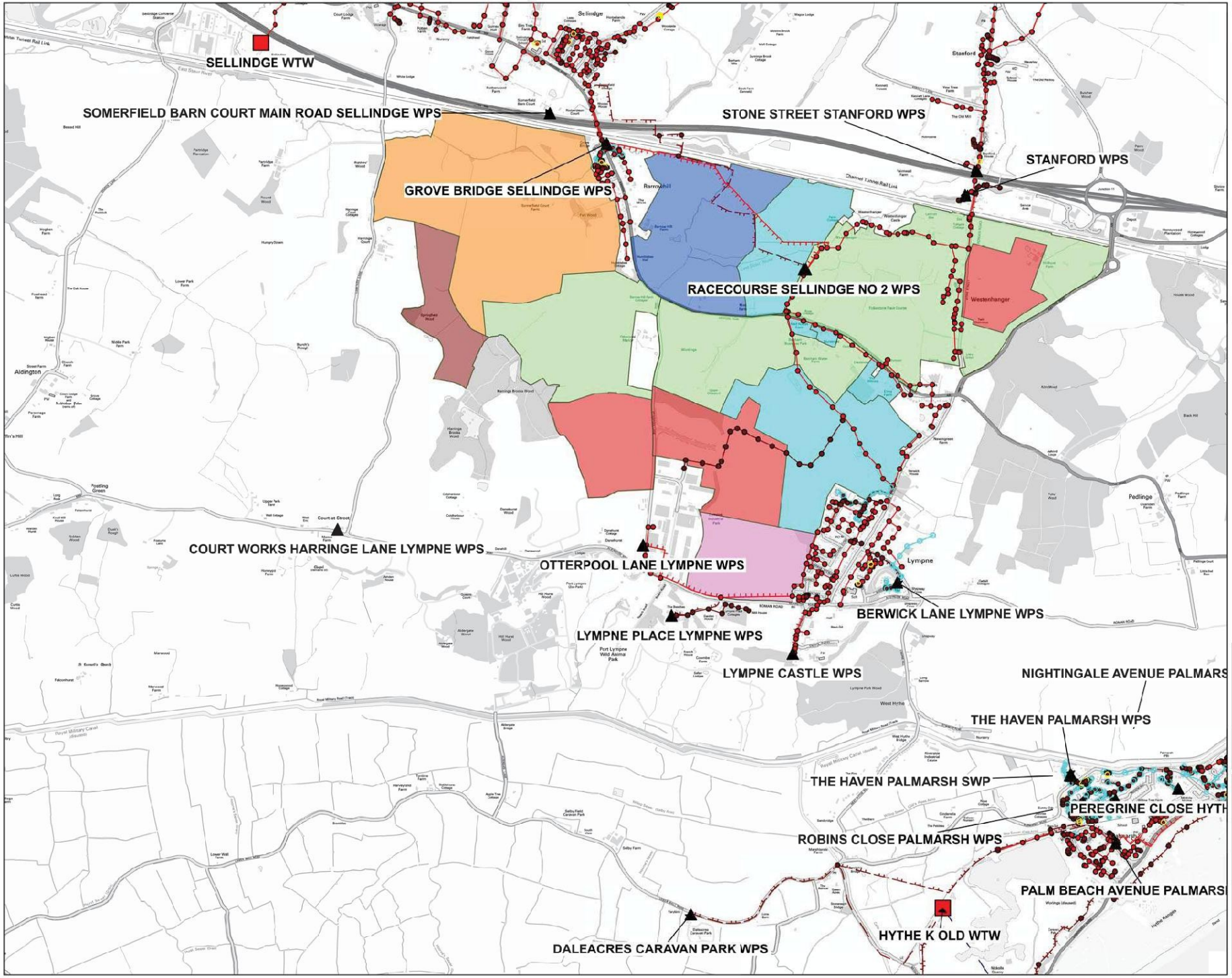
Intranet WebGIS 2.1

Kent County Area

Scotia Gas Networks plc

This plan shows the location of those pipes owned by Scotia Gas Networks (SGN) by virtue of being a licensed Gas Transporter (GT). Gas pipes owned by other GTs or third parties may also be present in this area but are not shown on this plan. Information with regard to such pipes should be obtained from the relevant owners. No warranties are given with regard to the accuracy of the information shown on this plan. Service pipes, valves, siphons, sub-connections etc are not shown but their presence should be anticipated. You should be aware that a small percentage of our pipes/assets may be undergoing review and will temporarily be highlighted in yellow. If your proposed works are close to one of these pipes, you should contact the SGN Plant Protection Team on 08450703497 for advice. No liability of any kind whatsoever is accepted by SGN or its agents, servants or sub-contractors for any error or omission contained herein. Safe digging practices, in accordance with HS (G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that plant location information is provided to all persons (whether direct labour or sub-contractors) working for you on or near gas apparatus. Information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

A6 – Existing Waste Water Infrastructure Records



Subcatchment Legend

Region

Conduit Legend

Line

Node Legend

Point

Point

Point

Existing Pumping Station

PS

Existing Treatment Works

WWTW

OTTERPOOL PARK - INDICATIVE FOUL WATER STRATEGY - EXISTING SW ASSETS

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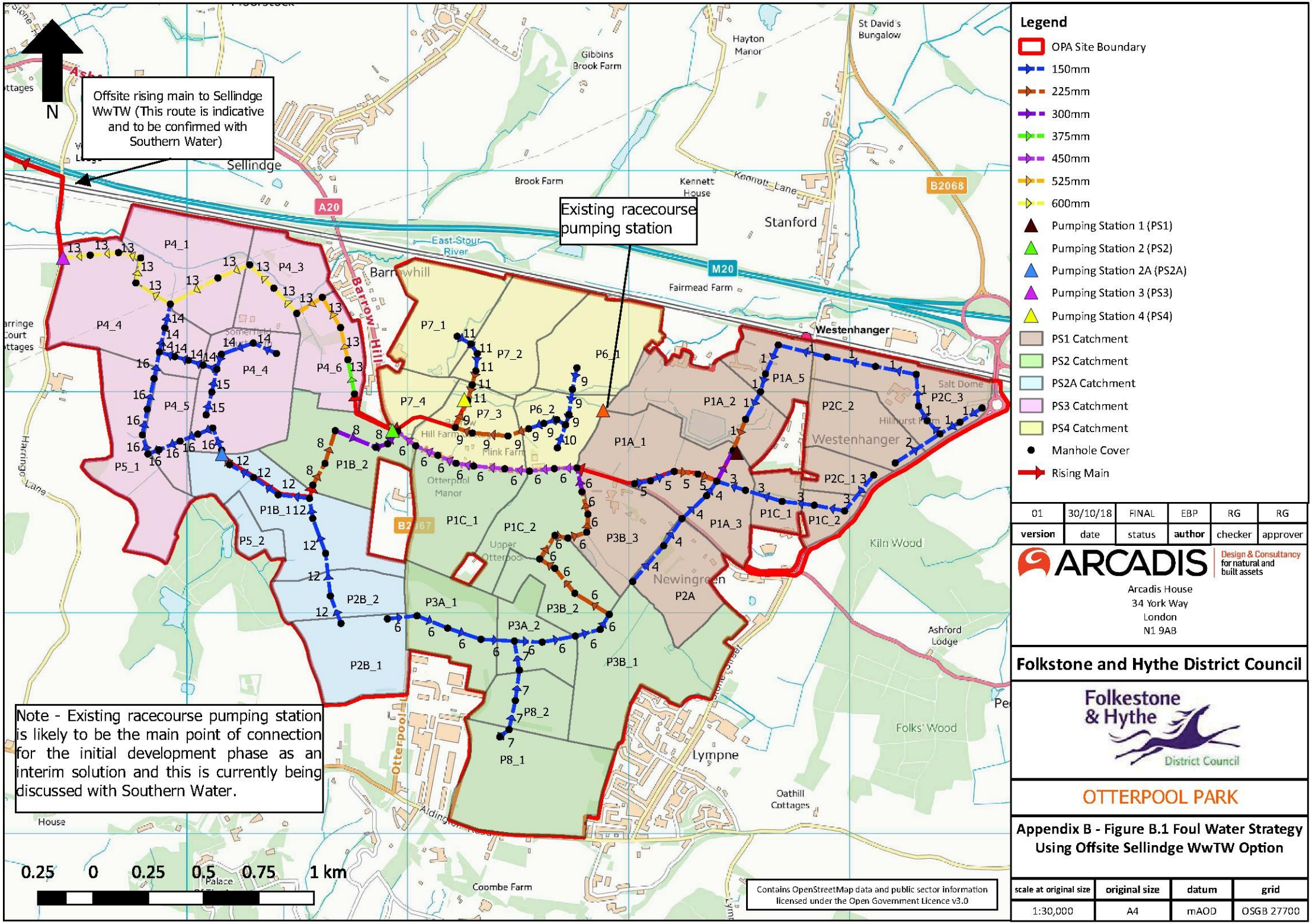
A7 – Waste Water Solution – Option 1



Legend

- OPA Site Boundary
- 150mm
- 225mm
- 300mm
- 375mm
- 450mm
- 525mm
- 600mm
- Pumping Station 1 (PS1)
- Pumping Station 2 (PS2)
- Pumping Station 2A (PS2A)
- Pumping Station 3 (PS3)
- Pumping Station 4 (PS4)
- PS1 Catchment
- PS2 Catchment
- PS2A Catchment
- PS3 Catchment
- PS4 Catchment
- Manhole Cover
- Rising Main

version	date	status	author	checker	approver
01	30/10/18	FINAL	EBP	RG	RG

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Folkstone and Hythe District Council

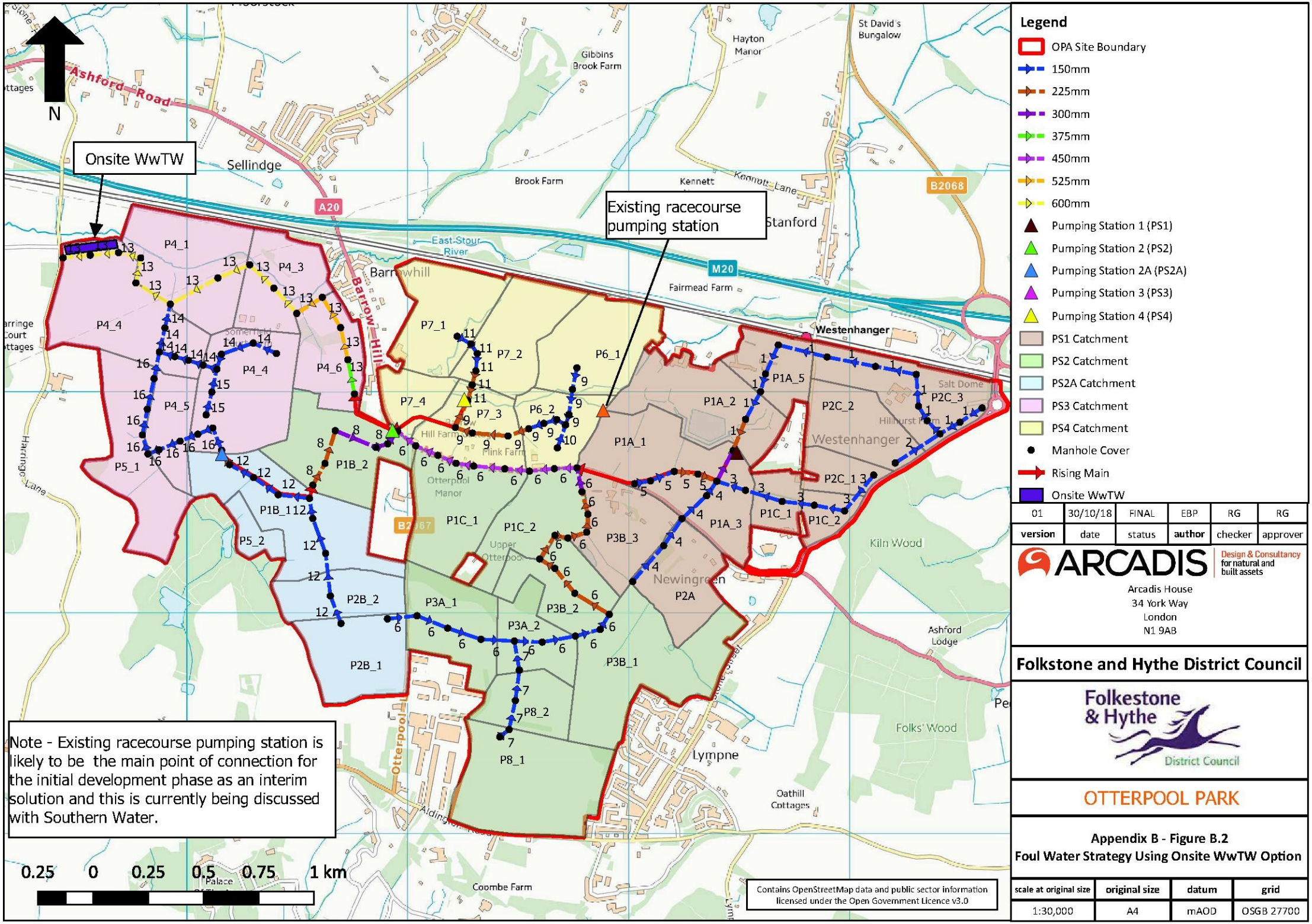
Folkestone & Hythe District Council

OTTERPOOL PARK

Appendix B - Figure B.1 Foul Water Strategy Using Offsite Sellindge WwTW Option

scale at original size	original size	datum	grid
1:30,000	A4	mAOD	OSGB 27700

A8 – Waste Water Solution – Option 2



Legend

- OPA Site Boundary
- 150mm
- 225mm
- 300mm
- 375mm
- 450mm
- 525mm
- 600mm
- Pumping Station 1 (PS1)
- Pumping Station 2 (PS2)
- Pumping Station 2A (PS2A)
- Pumping Station 3 (PS3)
- Pumping Station 4 (PS4)
- PS1 Catchment
- PS2 Catchment
- PS2A Catchment
- PS3 Catchment
- PS4 Catchment
- Manhole Cover
- Rising Main
- Onsite WwTW

version	date	status	author	checker	approver
01	30/10/18	FINAL	EBP	RG	RG

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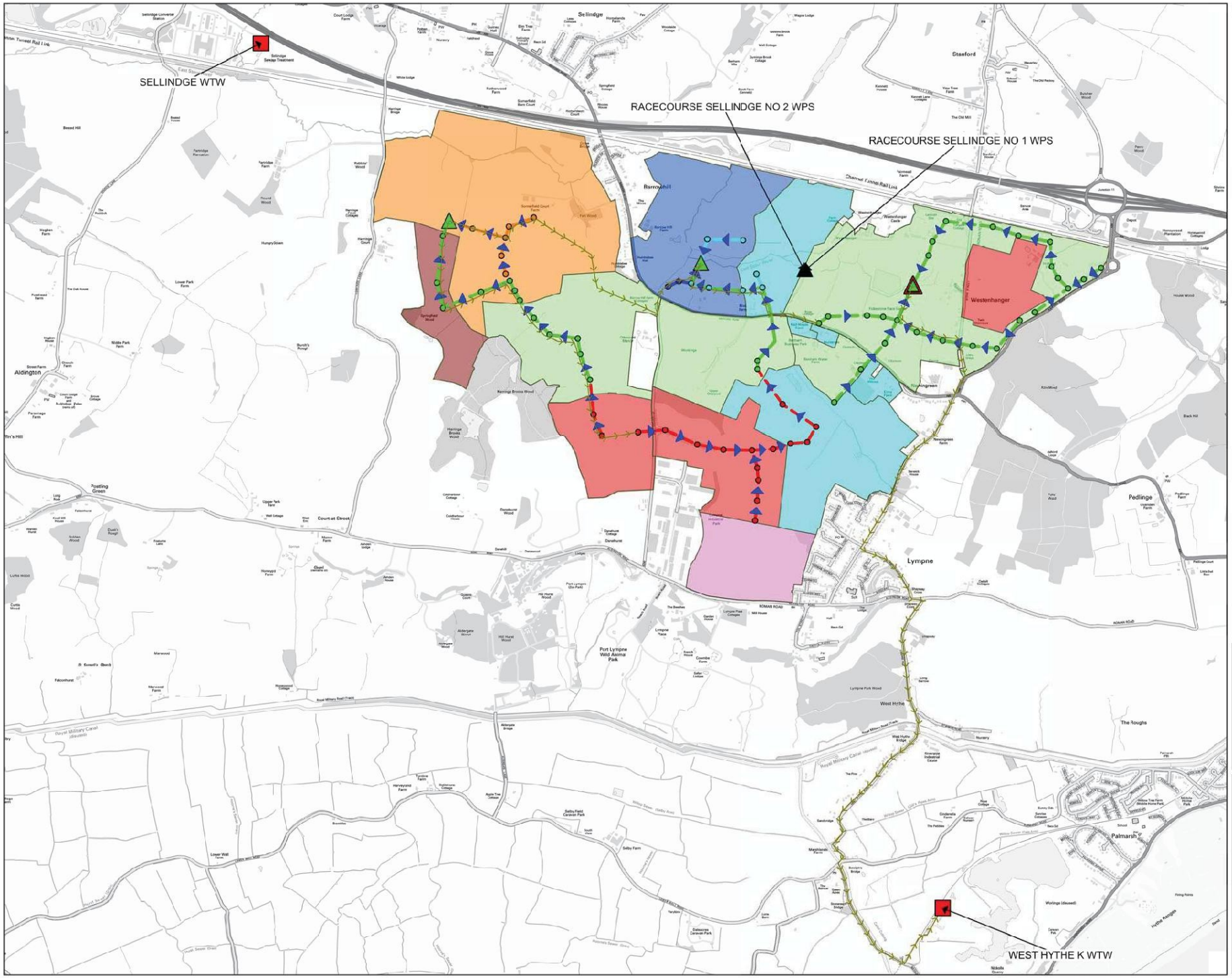
Folkestone & Hythe District Council

OTTERPOOL PARK

Appendix B - Figure B.2
Foul Water Strategy Using Onsite WwTW Option

scale at original size	original size	datum	grid
1:30,000	A4	mAOD	OSGB 27700

A9 – Waste Water Solution – Option 3



Masterplan Development Phases

- Phase-1
- Phase-2
- Phase-3
- Phase-4
- Phase-5
- Phase-6
- Phase-7

Proposed Pipes

- Phase-1
- Phase-2
- Phase-3
- Phase-4
- Phase-6

Proposed Manholes

- Phase-1
- Phase-2
- Phase-3
- Phase-4
- Phase-6

Proposed Pumping Stations

- Phase-1

Proposed Rising Main

- Rising Main

Terminal Pumping Station

- Terminal PS

Existing Pumping Station

- PS

Existing Treatment Works

- WWTW

OTTERPOOL PARK - INDICATIVE FOUL WATER STRATEGY OPTION - 1 : DISPOSAL TO WEST HYTHE WTW

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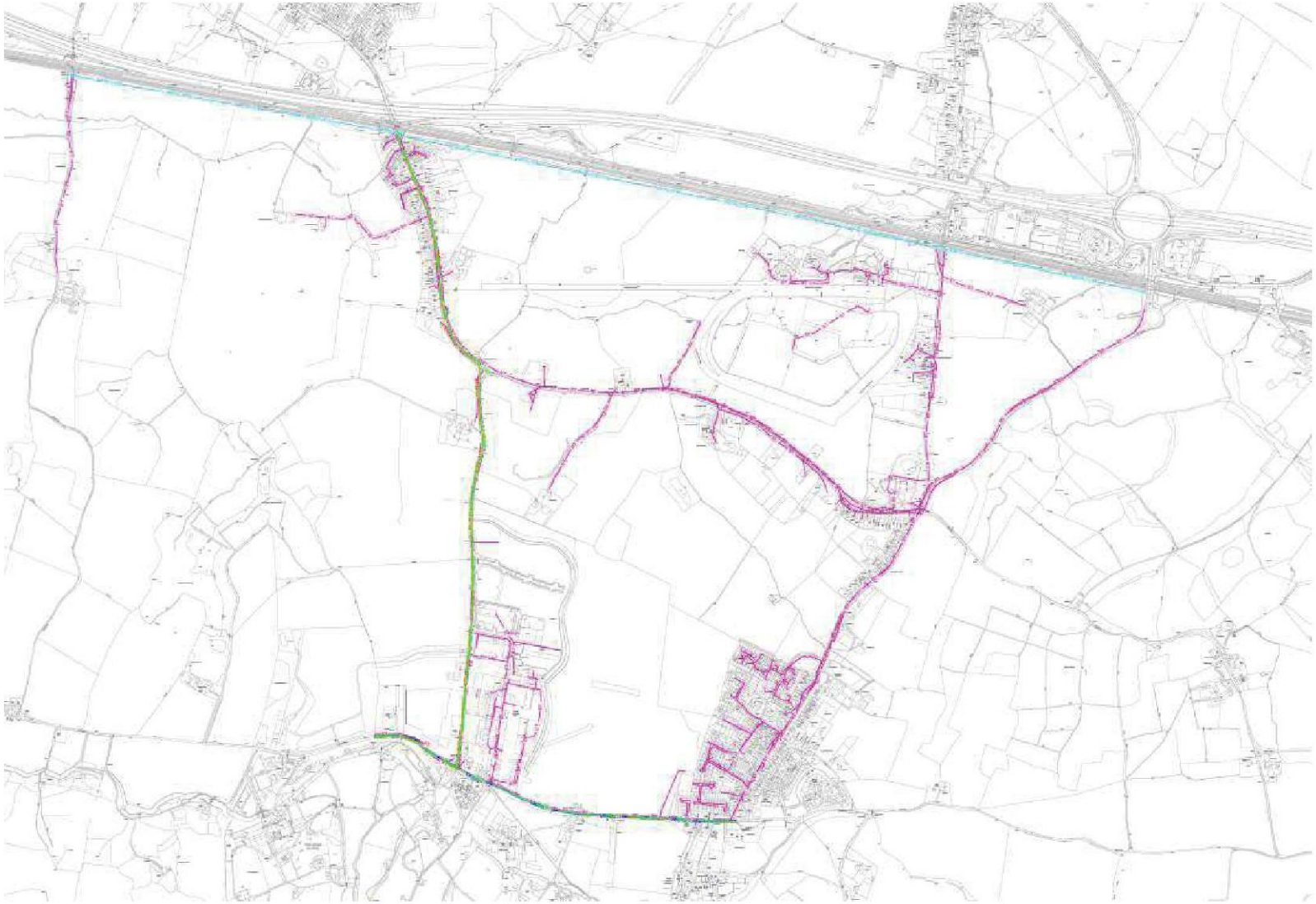
A10 – Existing Telecommunications Infrastructure Records

Appendix A10 – Existing Telecommunications Network Records (Various)



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