Greater Dublin Drainage Project

Irish Water

Environmental Impact Assessment Report: Volume 2 Part A of 6

Chapter 5 Consideration of Alternatives

June 2018

Contents

5. Consideration of Alternatives

5.1 Introduction

This Chapter describes alternatives considered during the progression of the Greater Dublin Drainage Project (hereafter referred to as the Proposed Project) to the proposed design solution. The alternative options considered are described in the following sequence of progression of the Proposed Project:

- Do Nothing;
- Alternative Non-Project Approaches to the provision of additional wastewater treatment;
- Alternative strategic drainage scenarios to the provision of the required additional wastewater treatment capacity;
- Alternative Sites Assessment (ASA) and Route Selection; and
- Consideration of potential for reuse of treated wastewater.

5.2 Alternatives Overview

The *Greater Dublin Strategic Drainage Study* (GDSDS) *Final Strategy Report* (Dublin Drainage Consultancy 2005) identified the need for additional wastewater treatment capacity within the Dublin area. A key recommendation of the GDSDS Final Strategy, as amended by its *Strategic Environmental Assessment* (SEA) (Fingal County Council (FCC) 2008), was that this additional wastewater treatment capacity was best provided by the construction of a single Regional Wastewater Treatment Plant (WwTP) (hereafter referred to as the proposed WwTP) in north County Dublin discharging into the Irish Sea, and an orbital drainage network to divert, either in full or in part, some existing foul drainage catchments to this new proposed WwTP.

In addition to the 'Do Nothing' scenario, alternative scenarios which did not require the construction of new WwTPs, including the upgrading of existing combined/foul sewer networks and WwTPs were considered by the GDSDS. The outcome of these considerations is summarised in Section 5.3 and Section 5.4.

The GDSDS and its SEA also considered alternative strategic drainage scenarios to provide the required additional wastewater treatment capacity. These alternative strategic drainage scenarios ranged from the development of a network of community WwTPs (e.g. 850 no. WwTPs with a 1,000 Population Equivalent (PE) (approx.) treatment capacity), each discharging to the nearest surface water or groundwater bodies, to the development of a single Regional WwTP in North County Dublin. The outcome of these considerations is summarised in Section 5.3.

A review of the GDSDS Final Strategy Report and its SEA by the project team in 2017 concluded that the findings and recommendations of these reports remain valid for the following reasons:

- The assumptions and data supporting the GDSDS and SEA findings and recommendations have not changed significantly in the intervening years;
- Population numbers and commercial/industrial activity in the Greater Dublin Area (GDA) have continued to grow in the period since the GDSDS Final Strategy was published in 2005. Analysis of the 2016 Census indicates that the population of the GDA had increased by 244,796 (14.7%) since the 2006 Census;
- Investment in the foul/combined drainage infrastructure in the GDA since 2005 has been limited, by either site or receiving water constraints, to upgrading the treatment capacity of the existing WwTPs to their ultimate

treatment capacity. Even with these upgrades completed, further additional wastewater treatment capacity will be required to cater for projected future growth in the GDA;

- There continues to be limited capacity in the existing drainage networks to accept flows from future development, with significant overloading of sewers, deficiencies at combined sewer overflows (CSOs) and increased risk of sewer flooding throughout the network;
- Pressures on water quality from discharges from the overloaded sewers at CSOs continue to pose an unacceptable risk to biodiversity, flora and fauna in the receiving environment;
- The need for additional wastewater treatment capacity within the GDA was confirmed with a revised 2050 projected treatment capacity requirement of 500,000 PE; and
- This additional wastewater treatment capacity was best provided by the construction of a single Regional WwTP in North County Dublin discharging into the Irish Sea.

A key recommendation of the SEA of the GDSDS was that a comprehensive ASA and Route Selection study be undertaken, with the overall objective of selecting a preferred site for the proposed WwTP, a preferred location for the marine outfall and preferred routes for the associated orbital sewer and outfall pipeline. Section 5.5 summarises the methodology used in the ASA study to identify the final preferred site option, commencing from a preliminary screening assessment through to final selection of preferred site option.

A review of the ASA reports carried out by the project team in 2017 found that the assumptions and data supporting the ASA findings and recommendations have not changed significantly in the intervening years and concluded that the proposed site at Clonshagh remained the 'most favourable' site for the proposed WwTP.

The Proposed Project team also carried out an assessment of the potential for reuse of the treated wastewater from the proposed WwTP to determine whether the volume of wastewater to be discharged to the marine could be reduced. The findings of this assessment are reported in the *Assessment of Potential for Reuse of Treated Wastewater from Proposed Regional WwTP* (Jacobs Tobin 2017), which is appended as Appendix A5.1 and summarised in Section 5.8.

5.3 'Do Nothing' Scenario

The SEA assessed a 'Do Nothing' scenario under Scenario 8 of the strategic drainage scenarios. This scenario was assessed as having a total of five Major Negative impacts under the following Environmental Objectives:

- Biodiversity: Flora and Fauna, due to the absence of strategic investment in additional drainage and wastewater infrastructure. Existing pressures on water quality from CSOs and discharges from WwTPs, which are significant in the study area, would continue to pose an unacceptable risk to biodiversity, flora and fauna in the receiving environment, ultimately resulting in inadequate implementation of existing European Community (e.g. Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (Water Framework Directive (WFD)) and national legislation;
- Population and Human Health: due to the likely significant human health impacts that would arise from the non-provision of additional wastewater treatment capacity to cater for future population growth in the GDA;
- Water: as the absence of strategic investment in additional drainage and wastewater infrastructure poses an unacceptable risk to human health and environmental protection and will result in inadequate implementation of existing European Community and national legislation;

- Air Quality: as no infrastructure is being provided under this scenario, and as such, existing pressures on the drainage network are likely to lead to poor operational performance; and
- Material Assets: as on the basis that no wastewater infrastructure will be provided under this scenario, negative impacts from the inadequate treatment of future wastewater loads (e.g. reduction in water quality, impacts on recreational assets such as rivers and bathing waters, severe limitations to the future growth and development of the Region, impacts to groundwater, potential contamination of drinking waters, potential human health impacts) will arise for the whole of the GDA, significantly impacting on the entire Region.

As Scenario 8 does not involve any strategic investment, it could be considered as being Major Positive under Economic factors. However, in the context of the economic implications of such a scenario, it is considered that it should be rated as Major Negative due to the required restrictions on development in light of the requirements of the WFD and the likely economic consequences of 'doing nothing'.

Scenario 8 offers the least flexibility to adequately cater for the drainage and wastewater treatment needs projected and is therefore rated as Major Negative under Flexibility.

The large number of Major Negative impacts reflects the significant future environmental, economic and sanitary problems (and the subsequent significant public health risks and impacts) which will arise if additional wastewater treatment capacity is not provided to cater for future wastewater loads. Scenario 8 was considered as not being feasible, and the SEA considered that it was imperative that additional wastewater treatment capacity be provided to support current and future development and growth of the GDA.

As the assumptions and data supporting the above assessment of a ‘Do Nothing’ scenario have not changed significantly in the intervening years, it has been determined that the findings of this assessment continue to be reasonable and correct.

5.4 Alternative Non-Project Approaches to Address the Shortfall in Wastewater Treatment

The potential for alternative approaches other than the provision of new WwTPs to address the shortfall in wastewater treatment capacity in the GDA was considered as part of the GDSDS. These included:

- Reducing the inflow of stormwater to the combined/foul sewer network by constructing dedicated stormwater sewers in areas containing only combined/foul sewers;
- Reducing groundwater infiltration to the combined/foul sewer network through a programme of sewer rehabilitation, which included sewer relining and/or replacement;
- Reducing the industrial load discharged to combined/foul sewer network, which would require a formal review of all licenced discharges to sewer; and
- Upgrading existing combined/foul sewer networks and WwTPs.

The GDSDS found that these combined alternative approaches would not remove the requirement for the provision of new wastewater treatment capacity. Furthermore, it determined that even with the expansion of each of the existing WwTPs to their ultimate design capacity the projected combined growth (residential population, commercial, institutional and industrial sources) in the GDA would exceed the treatment capacity provided by the existing WwTPs.

The GDSDS also determined that the ability to expand the treatment capacity at each of the WwTPs beyond their ultimate design capacity was limited by either site and/or receiving water constraints at each WwTP. It also found that there was limited capacity in the existing drainage networks to accept flows from future development, noting significant overloading of sewers, deficiencies at CSOs and increased risk of sewer flooding throughout the network. Constraints on further upgrade works to address these capacity issues, particularly in the network serving Ringsend, include the intensity of urban development, associated utilities and traffic. Considering the scale of the network upgrade work required, GDSDS described the constraints as representing:

'*a major engineering challenge, particularly where large diameter pipelines have to be constructed in roadways already saturated with utility services and traffic. Even with tunnel construction, the accommodation of shafts and protection of existing works, traffic management and general management of environmental impacts would be extremely difficult.*'

As the assumptions and data supporting the above assessment of alternative non-project approaches have not changed significantly in the intervening years, it has been determined that the findings of this assessment continue to be reasonable and correct.

5.5 Strategic Drainage Scenarios

The consideration of alternatives was a central element of the GDSDS and its SEA. The GDSDS Strategy considered eight strategic drainage scenarios for the provision of the required additional wastewater treatment capacity, as summarised in Table 5.1. However, during the SEA process a further eight additional strategic drainage scenarios, as summarised in Table 5.2, were included with a view to selecting a preferred final drainage strategy which performed best across a range of Environmental Objectives.

Table 5.1: Summary of the Original Greater Dublin Strategic Drainage Study Strategic Drainage Scenarios

Strategy Scenario	Summary Description of the Original Greater Dublin Strategic Drainage Study Strategic Drainage Scenarios
1A	Maximise conveyance of flows and loads to Ringsend WwTP via a major expansion to 2.8 million PE from the current PE of 1.64 million and modifications to the Grand Canal Sewer (GCS).
1B	This strategy scenario is similar to 1A (i.e. Ringsend increased in size to 2.8 million PE), but including the construction of a major new interceptor sewer along the River Liffey valley (approximately 23km in length, largely in tunnel) to convey flows to Ringsend, in parallel with GCS modifications.
2A	This scenario limits the increase at Ringsend to 2.16 million PE and, instead, requires the construction of a new state-of-the-art WwTP (350,000 PE) with a discharge to the River Liffey upstream of Islandbridge. This scenario also included the construction of a 450,000 PE WwTP on the North Fingal coastline at Portrane.
2B	The key difference between Scenario 2B and Scenario 2A is the intention to discharge the treated effluent to the Liffey Estuary in the City rather than at Islandbridge.
2C	This scenario involves the construction of a single 850,000 PE WwTP at Portrane on the North Fingal coast in addition to the construction of a major sewer (predominantly in tunnel) with a number of pumping interfaces.
3A	This scenario proposes to limit the increase of Ringsend to 2.16 million PE and then convey all additional flows up to a regional WwTP of 850,000 PE via the reversal of the Sutton submarine pipeline (which currently transfers wastewater from Sutton to Ringsend). This aspect is common to Scenario 3A to Scenario 3C. The difference between all three

Strategy Scenario	Summary Description of the Original Greater Dublin Strategic Drainage Study Strategic Drainage Scenarios
	scenarios is how they convey the wastewater to Ringsend. Scenario 3A proposes to swap the GCS storm and foul cells (currently, the storm cell has spare capacity).
3B	This scenario proposes the construction of a new City Interceptor Sewer along the Liffey Quays to convey wastewater to Ringsend and then on to a proposed regional WwTP at Portrane via a reversal of the Sutton submarine pipeline.
3C	This involves the construction of a new foul cell within the storm section of the GCS to convey sewerage to Ringsend and then on to the regional WwTP at Portrane via a reversal of the Sutton submarine pipeline.

Table 5.2: Summary of Additional Strategic Drainage Scenarios Considered by the Strategic Environmental Assessment of the Greater Dublin Strategic Drainage Study

Strategy Scenario	Summary Description of Additional Strategic Drainage Scenarios Considered by the Strategic Environmental Assessment of the Greater Dublin Strategic Drainage Study
4	This scenario is similar to Scenario 2C in that it proposed a single 850,000 PE WwTP to be developed in stages, and a major sewer (predominantly in tunnel) with a number of pumping interfaces. However, unlike Scenario 2C (which specifies Portrane as the location), Scenario 4 proposes that a suitable site be found (post the SEA process) in the northern part of the GDSDS study area following a rigorous ASA process.
5A	This scenario envisages seven sub-regional WwTPs which would provide treatment to foul flows from specific catchments on a foul-catchment-by-foul-catchment basis. The treated effluent from these plants would be discharged to the nearest surface water or groundwater bodies. These WwTP sizes range from 40,000 PE to 150,000 PE.
5B	This scenario has a similar range of WwTPs as Scenario 5A, but instead of having groundwater and/or surface water discharge, it proposes to have a regional treated effluent pipeline with a coastal discharge to the Irish Sea.
6A	This scenario considers the development of a network of community WwTPs (e.g. 850 no. WwTPs with a treatment capacity of 1,000 PE (approx.), each discharging to the nearest surface water or groundwater bodies. This scenario also requires a series of sludge treatment centres.
6B	Similar to Scenario 6A, this scenario has a network of community WwTPs. However, instead of discharging locally to groundwater or surface water bodies, this scenario will differ in that each WwTP will discharge into a common treated effluent pipeline which ultimately discharges to the Irish Sea.
7A	This scenario envisages 15 sub-regional WwTPs which would provide treatment to foul flows from specific catchments on a foul-catchment-by-foul-catchment basis. The treated effluent from these plants would be discharged to the nearest surface water or groundwater bodies. These WwTP would range in size from 20,000 PE to 65,000 PE.
7B	This scenario has a similar range of WwTPs to Scenario 7A, but instead of relying on discharges to groundwater/surface waters, it proposes to have a regional treated effluent pipeline with a coastal discharge to the Irish Sea.
8	This scenario is the 'Do Nothing' scenario. It has been included to assess the potential effects that are likely to arise if no new wastewater infrastructure is provided and relies on a strategy of maintenance of the existing WwTP network in the GDSDS area.

The 16 strategic drainage scenarios, as listed in Table 5.1 and Table 5.2 above, were then assessed in the SEA against the 13 Environmental Objectives listed in Table 5.3. The SEA based the selection of the preferred strategic drainage scenario on a qualitative consideration of the relative performance of each scenario against the individual Environmental Objectives. It is important to note that the assessment was focused on the strategic/high-level effects, rather than site-specific issues.

Table 5.3: Environmental Objectives for the Strategic Environmental Assessment on the Greater Dublin Strategic Drainage Study Strategy

Strategic Environmental Assessment of Greater Dublin Strategic Drainage Study Environmental Objectives	
Biodiversity, Flora and Fauna	Population and Human Health
Water	Air
Climatic Factors	Material Assets
Cultural Heritage	Landscape
Inter-relationships between the above factors and cumulative impacts	Engineering
Economic Factors	

The key point to emerge from the SEA process was that inland discharging of treated effluent is not the preferred strategic environmental decision due to the environmental pressures on surface waters and groundwaters. A significant consideration is the risk of future reduced capacity in these waterbodies to accept wastewater discharges, arising from the predicted effects of climate change. The stringent quality standards in the receiving environment will be achieved arising from the ongoing implementation of European legislation, including the WFD. A coastal discharge of treated effluent (subject to the selection of an appropriate location for the outfall from the proposed WwTP) would present the most flexibility for management of the wastewater discharges arising from the Proposed Project. In parallel, having an orbital wastewater pipeline developed across the western and northern parts of the GDA would provide the required infrastructure and flexibility of approach necessary to accommodate the future wastewater from these areas.

5.5.1 Overview of Strategic Environmental Assessment Findings

The SEA assessed strategic drainage scenario 1A, 1B, 2A, 2B, 5A, 6A and 7A as likely to have Major Negative effects on Biodiversity, Flora & Fauna and Water. These scenarios primarily rely on discharges of effluent to Dublin Bay and the Rivers Liffey, Tolka and Broadmeadow across the study area. The aforementioned water bodies are well documented as being under pressure from existing pollution sources. The additional pollutant load from these strategic drainage scenarios would likely result in significant negative environmental effects. These effects would conflict directly with the WFDs 'good water status' objective and, coupled with climate change considerations (e.g. reduction in 'base flows' in rivers), were not considered to be sustainable future strategies.

Strategic drainage scenarios 1A, 1B and 6A were considered likely to have Major Negative effects on Population and Human Health due to the potential impacts on Dublin Bay, various recreational assets in the study area and public health or nuisance risks.

Strategic drainage Scenario 6B relies on the construction of an extensive network of community based WwTPs (e.g. 850 no. WwTPs with a treatment capacity of 1,000 PE) linking to a treated effluent orbital pipeline. This scenario was assessed as having a number of distinct disadvantages which would render it impractical, e.g. excessive pumping and energy consumption requirements, protracted design and strategy delivery process, sludge management and transportation complexities, operational control and environmental risks. This scenario was assessed as having Major Negative impacts for Air Quality, Climatic Factors Material Assets, Cultural Heritage and Landscape due to the number of community-scale WwTPs required (850+).

Strategic drainage Scenarios 3A, 3B, 3C and 7B were assessed as having significant negative environmental effects, particularly under Climatic Factors, due to the likely extensive pumping requirements associated with them, in addition to the complex engineering design considerations (e.g. reversal of flows through the Sutton submarine pipeline and unnecessary works on the GCS).

Strategic drainage Scenario 2C is reliant on the development of a regional WwTP at Portrane which was not favoured in the absence of a comprehensive site selection and environmental suitability assessment.

Strategic drainage Scenario 5B relies on the development of multiple WwTPs across the study area to serve individual growth areas and, as such, was not favoured as a coherent integrated strategic approach.

Strategic drainage Scenario 4 was assessed as presenting the greatest flexibility and opportunity for ensuring that the status of waters in the GDA comply with the requirements of the WFD.

The SEA therefore concluded that Scenario 4 was the preferred strategic drainage scenario, as it offers the most environmentally, economically and technically advantageous strategic drainage scenario of the 16 that were considered in the SEA process. It considered this scenario to present the greatest flexibility and opportunity for ensuring that the status of waters in the GDA comply with the requirements of the WFD, through eliminating current and minimising future discharges to rivers or groundwater in the study area. The implementation of the preferred strategic drainage scenario will provide sufficient drainage treatment capacity to meet the future needs of the GDA and will facilitate the ongoing population and economic growth of the Region. Currently, the lack of wastewater treatment capacity in certain parts of the GDA is already posing constraints on the implementation of existing accepted planned sustainable development as set out in the respective City and County Development Plans.

The SEA also considered that a single, regional WwTP was preferable to a series of sub-regional WwTPs, as a single plant offers the greatest planning, procurement, engineering, cost, flexibility and future operational benefits in comparison to a network comprising multiple WwTPs.

In the hierarchy of environmental mitigation, the preferred mitigation is through avoidance of environmental impacts. In this regard, the SEA recommended that an ASA be progressed for Scenario 4 to avoid significant environmental impacts, where possible, through the selection of appropriate locations for particular elements of infrastructure, including:

- Regional WwTP;
- Outfall location in the Irish Sea off the North GDA coastline; and
- Route of the orbital sewer pipeline.

As the assumptions and data supporting the SEA of the GDSDS have not changed significantly in the intervening years, it has been determined that the findings and recommendations of the SEA continue to be reasonable and correct.

5.6 Alternative Sites Assessment and Route Selection

The ASA and Route Selection was undertaken having regard to the recommendations set out in the SEA on the GDSDS, which envisaged a process comprising four distinct phases, as outlined below.

Phase 1 – Alternative Sites Identification (Preliminary Screening)

This phase involved the identification of a number of land parcels of suitable size within which the proposed WwTP and corridors for routing of the orbital sewer and outfall pipeline corridor could be located and potential marine outfall locations. The Phase 1 – Alternative Sites Identification included public consultation, desktop studies, mapping of constraints and a screening of the study area.

Phase 1 involved an assessment of available lands. A total of 22 land parcels were identified as being of suitable size to accommodate the proposed WwTP. The identified land parcels were assessed with respect to planning permissions granted and potential locations for transfer pipelines and marine outfalls. Two land parcels were screened out due to extant permissions. The remaining 20 land parcels were then assessed with respect to proximity to load centres, transfer pipeline corridors and feasible outfall locations. This process resulted in a further eight land parcels being screened out as they were not 'favourably' located to the identified load centres and pipeline corridors.

The 12 remaining land parcels were then assessed under high level engineering and design constraints which included:

- Interception points and invert levels on the existing drainage network in each of the load centres;
- Elevation of the individual land parcels;
- Consideration of whether the forward flows to the WWTP from the load centres could be achieved by gravity or pumped flows;
- Pipeline gradients; and
- Consideration of power requirements and energy usage for pumped flows.

This assessment concluded that three of the 12 land parcels were less favourable. The final step in the Phase 1 process involved the compilation of a short list of land parcels to take forward the Phase 2. The report recommended that nine land parcels, associated orbital sewer and outfall pipeline corridors and marine outfall study areas be brought forward for further consideration against a range of technical and environmental criteria under Phase 2 of the ASA.

As the assumptions and data supporting Phase 1 of the ASA have not changed significantly in the intervening years, it has been determined that the findings of Phase 1 of the ASA continue to be reasonable and correct. Full details of this phase are provided in the *Alternative Sites Assessment – Phase One: Preliminary Screening Outcomes Report* (Jacobs Tobin 2011), which was published in October 2011

Phase 2 – Alternative Sites Assessment

Phase 2 of the ASA process took the nine land parcels shortlisted in Phase 1 and assessed their performance against a range of environmental and technical criteria leading to the identification of three emerging preferred sites for the proposed WwTP, associated orbital sewer and outfall pipeline corridor and marine outfall location. Phase 2 of the ASA process included public consultation on the nine shortlisted land parcels, orbital sewer and outfall pipeline corridors and marine outfall locations; desktop studies; windshield surveys; site visits; and impact assessments by the project consultants including various engineering and environmental specialists. It also included consideration of issues and concerns identified during the consultation period.

Each of the nine site options were assessed in relation to environmental and technical criteria as listed in Table 5.4.

Table 5.4: Alternative Sites Assessment Phase 2 Criteria

Environmental Criteria	Technical Criteria
Ecology	Safety
Cultural Heritage	Planning Policy
Landscape and Visual	Engineering and Design
Hydrology and Hydrogeology	Capital and Operational Costs
Soils and Geology	Sustainability
Traffic	
Air Quality and Odour	
Agriculture and Agronomy	
Noise and Vibration	
People and Communities	

Each land parcel option was assessed by the relevant technical and environmental specialist under each of these criteria. These assessments were used to identify the differentiating sub-criteria to be used in the identification of the preferred site within each of the land parcels and, subsequently, the identification of the emerging preferred site option. The full list of agreed sub-criteria for each of the environmental and technical criteria is provided in Appendix 3 of the *Alternative Sites Assessment and Route Selection Report (Phase 2): Emerging Preferred Sites and Routes* (Jacobs Tobin 2012a).

The outcomes of each of these assessments were combined into an overall assessment matrix. 'Least favourable' classifications were applied to sub-criteria cells in the primary assessment matrix, and following a subsequent review of the matrix in an iterative process, the Proposed Project team was able to determine whether site options with 'least favourable' classifications were:

- Of such significance that it would be comparatively difficult to secure planning permission on that site option; or
- Of such environmental disadvantage that with the range of choice available the site option should not be considered further.

Following this iterative process, the ASA Phase 2 report recommended that the three emerging preferred site options (Annsbrook, Clonshagh and Newtowncorduff) be brought forward for further consideration under Phase 3 and Phase 4 of the ASA process.

As the assumptions and data supporting Phase 2 of the ASA have not changed significantly in the intervening years, it has been determined that the findings of Phase 2 of the ASA continue to be reasonable and correct. Full details of this phase are provided in *the Alternative Sites Assessment and Route Selection Report (Phase 2): Emerging Preferred Sites and Routes* (Jacobs Tobin 2012a), which was published in May 2012.

Phase 3 – Consultation Phase

Following completion of Phase 2 and publication of the *Alternative Sites Assessment and Route Selection Report (Phase 2): Emerging Preferred Sites and Routes* (Jacobs Tobin 2012a), the three emerging preferred site options were brought through public consultation held over an eight-week period from 14 May 2012 to 6 July 2012. The primary objective of this phase was to gather any additional information on the three emerging preferred site options (i.e. proposed WwTP site, orbital sewer and outfall pipeline corridor and associated marine outfall location).

Stakeholder feedback from this third phase of public consultation was documented in the *Public Consultation Report on Alternative Sites Assessment Phase Two: Emerging Preferred Sites and Routes* (RPS 2012a), which was published in May 2012.

The purpose of this consultation report was to document stakeholder feedback and to ensure that the wider Proposed Project Team reviewed and considered issues raised by stakeholders, as appropriate.

The Project Team's response to the issues raised was presented in the *Alternative Sites Assessment and Route Selection (Phase 3): Consultation Response Report* (RPS 2012b), which was published in June 2012 and was included as Appendix 4 of the *Alternative Sites Assessment and Route Selection Report (Phase 4) Final Preferred Site and Routes* (Jacobs Tobin 2013).

This stakeholder feedback, along with a technical and environmental assessment undertaken as part of ASA Phase 4 assessment, aided the decision-making process in selecting a single preferred site option.

Phase 4 – Selection of the Preferred Site, Pipeline Routes and Outfall Location

Phase 4 constitutes the final identification of the preferred site option (i.e. proposed WwTP site, orbital sewer and outfall pipeline corridor and associated marine outfall location), and consisted of the following steps:

Step 1	Review of the assessment findings from the ASA Phase 2 process which is reported in the *Alternative Sites Assessment and Route Selection Report (Phase 2): Emerging Preferred Sites and Routes* (Jacobs Tobin 2012a).
Step 2	Consideration of the submissions received during Phase 3 of the ASA process which was held over an eight-week period from 14 May 2012 to 6 July 2012. Full details of this phase are provided in the *Public Consultation Report on Alternative Sites Assessment Phase Two: Emerging Preferred Sites and Routes* (RPS 2012a), which was published in October 2012.
Step 3	Undertake further investigative studies to supplement the data collected and assessed during ASA Phase 2 and which were also informed by consideration of submissions received.
Step 4	Assessment of the findings of the further investigative studies to determine whether anything of such significance was identified which made the development of any of the three emerging preferred site options unfeasible.

Step 5	Assessment of the individual components of the site options (proposed WwTP site, marine outfall locations and associated orbital sewers and outfall pipelines) against the findings of *Step 1* to *Step 3* above. Identification of constraints for the individual components and the identification of potential mitigation measures where the ASA Phase 4 assessment indicated that it was not possible to avoid impacts.
Step 6	Preparation of preliminary cost estimates.
Step 7	Combine the assessment of the individual components from *Step 5 and Step 6* into one overall emerging preferred site option assessment matrix. Through a comparative assessment, assign 'more' and 'less' favourable classifications to the identified constraints.
Step 8	Selection of final preferred site option based on the relative performance of each of the site options against the Environmental, Technical and Cost criteria considered.

The ASA Phase 4 assessment determined that it is technically feasible to construct all three site options. However, it was identified that all site options had, to varying degrees, 'less favourable' classifications under the aforementioned range of Environmental, Technical and Cost criteria considered.

In comparison to both the Annsbrook and Newtowncorduff site options, the Clonshagh site option (WwTP site, southern marine outfall and orbital sewers) was assessed as being 'more favourable' under a greater number of the Environmental and Technical criteria.

The Clonshagh site option was considered 'more favourable' based on the following:

- The Clonshagh site was identified as being of less ecological value when compared to the other two sites;
- The proposed WwTP can be designed such that there is no impact on the archaeological remains identified at the edges of the Clonshagh site;
- The southern outfall exhibits better initial dilution and mixing characteristics for the effluent plume than the northern outfall;
- Tunnelling of the southern outfall poses less technical difficulty than tunnelling of the northern outfall; and
- The total length of pipeline for this site option is significantly shorter than the pipeline for the other two site options, which provides for:
    - Less ecological impact;
    - Fewer watercourse crossings;
    - Lower number of crossings of key existing and proposed infrastructure;
    - Less potential to disrupt the landscape structure during construction; and
    - Lower energy requirements.

On completion of the ASA and Route Selection process with the publication of the *Alternative Sites Assessment and Route Selection Report (Phase 4) Final Preferred Site and Routes* (Jacobs Tobin 2013), the Clonshagh site option (i.e. WwTP site at Clonshagh, marine outfall located approximately 1km north-east of Ireland's Eye and its

associated orbital sewers and outfall pipeline corridor) was identified to be the most environmentally, technically and economically advantageous option. The Clonshagh site option was therefore recommended as the final preferred site option and was brought forward for further assessment under the Environmental Impact Assessment (EIA) and Appropriate Assessment processes.

As the assumptions and data supporting Phase 4 of the ASA have not changed significantly in the intervening years, it has been determined that the findings and recommendation of Phase 4 of the ASA continue to be reasonable and correct. Full details of this phase are provided in the *Alternative Sites Assessment and Route Selection Report (Phase 4) Final Preferred Site and Routes* (Jacobs Tobin 2013), which was published in June 2013

5.7 Consideration of Outfall Location

As part of the ASA and Route Selection process, a preliminary modelling study was undertaken by MarCon in 2011 (MarCon 2011) to identify a range of potential marine outfall locations along the north Dublin coastline.

Hydrodynamic Modelling – Phase 1

The proposed discharge point was selected following appraisal of the preliminary (or Phase 1) hydrodynamic modelling study which undertook a comparative examination of the dispersal conditions from a range of outfall locations. The results from the preliminary modelling study identified the preferable locations for the discharge point and portrayed the dispersion patterns and comparative concentrations of the effluent discharges from each outfall. This work was reported in the *Alternative Site Assessment – Numerical Modelling Report (GP201103_doc001_04)* (MarCon 2011).

The following diagrams, relating to the southern outfall study area, have been extracted from the above report:

- Diagram 5-1 shows the discharge locations considered in the southern outfall study area;
- Diagram 5-2 illustrates the predicted solute plume at low water on a neap tide for discharge location No. 68 (the closest point to shore);
- Diagram 5-3 illustrates the predicted solute plume at low water on a neap tide for discharge location No. 72 (the farthest point out to sea); andDiagram 5-4 indicates the preferable locations for the discharge point in the southern outfall study area following analysis.

Diagram 5-2 and Diagram 5-3 demonstrate the comparative concentrations of the treated wastewater discharge, regardless of the final effluent standard, due to the local dispersal conditions. Discharge location No. 66 on Diagram 5-1 and Diagram 5-3 represents the selected discharge locations.

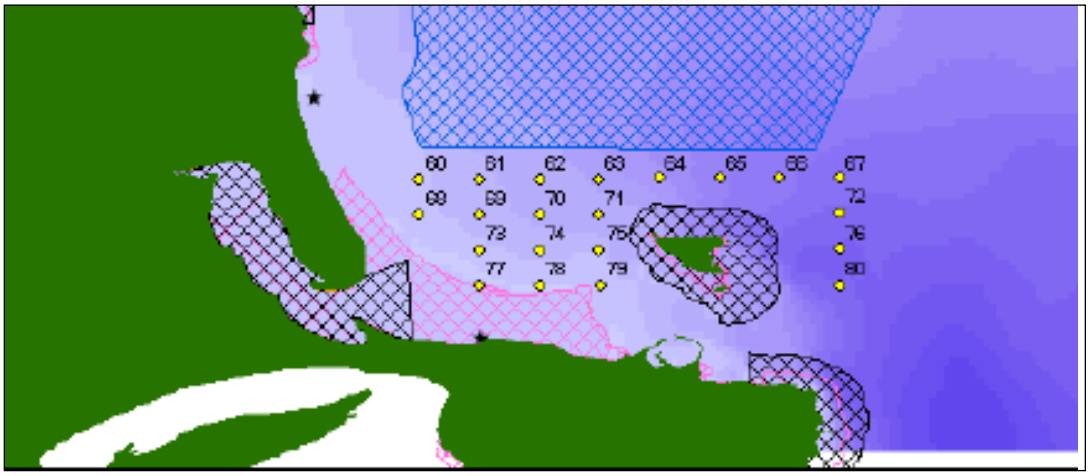

Diagram 5-1: Potential Outfall Locations

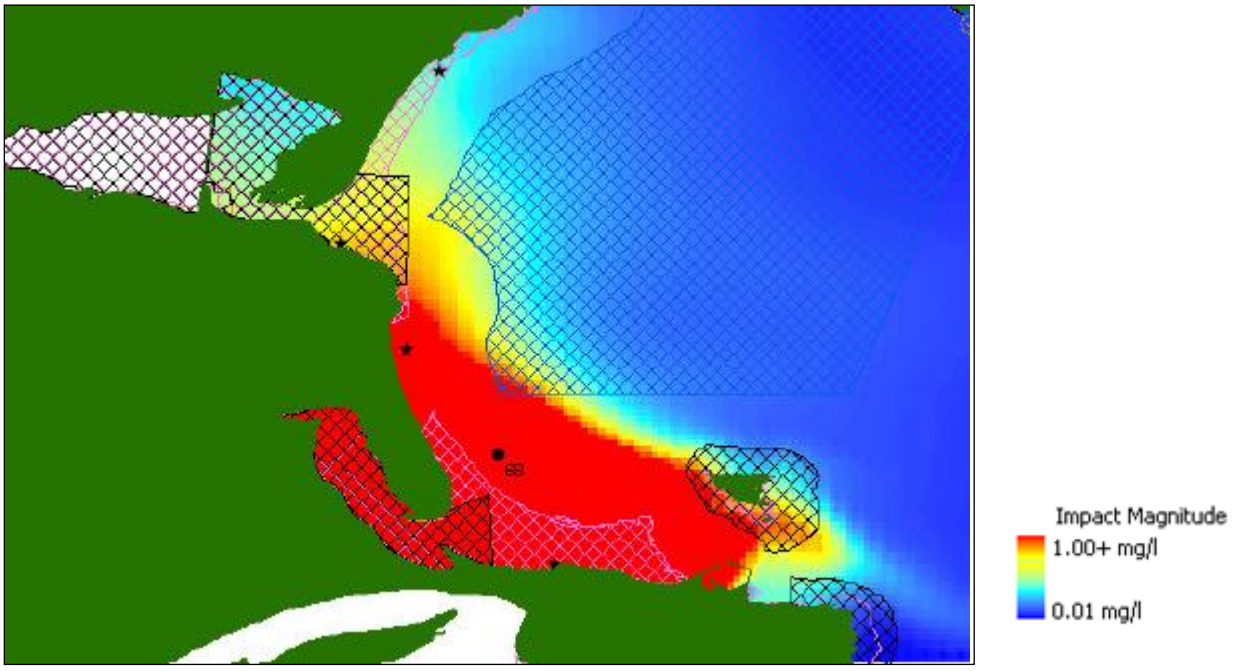

Diagram 5-2: Discharge Location No. 68

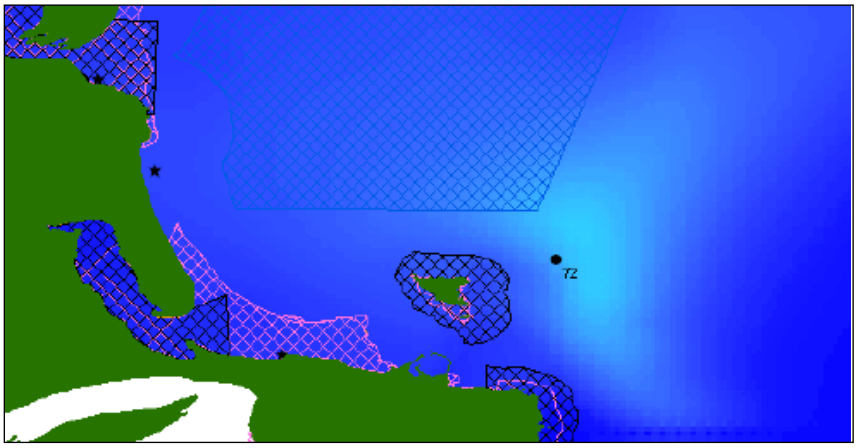

Diagram 5-3: Discharge Location No. 72

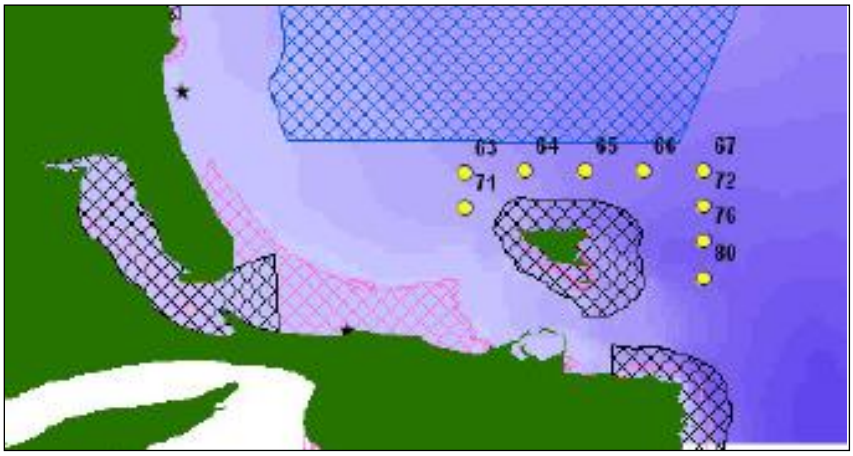

Diagram 5-4: Preferable Discharge Locations

Hydrodynamic Modelling – Phase 2

Phase 2 of the Hydrodynamic modelling examined and reported on the near-field dilution and dispersion characteristics from proposed outfalls discharging to the receiving waters in both the northern and southern study areas. The results from this phase of the modelling study predicted the dilution rates and concentrations of the treated wastewater discharged from each outfall and recommended the preferable location for the proposed discharge.

The most important predicted results are the dilution levels, and the distances from the outfall at which they were achieved. Comparison of the dilution characteristics allowed quantitative assessment of the northern and southern outfall locations.

An arbitrary dilution level of 20 dilutions was chosen to evaluate the receiving water's ability to assimilate the proposed treated wastewater discharge. A figure of 20 dilutions represents the reduction in treated wastewater concentration from 50mg/l to 2.5mg/l.

The model predicted that treated effluent released through the diffuser at the southern outfall location achieves 20 dilutions in a much shorter distance (generally ~50m) than treated wastewater discharged through the same diffuser at the northern outfall location (50m – 350m+).

The primary influencing factor in relation to the dilution capacity of the northern and southern outfall locations is the depth and volume of water in to which the outfalls discharge. The southern outfall location discharges into a mean water depth of 23m, whereas the northern outfall location discharges into a mean water depth of only 15m. The southern outfall location therefore has a greater volume of water to facilitate better initial dilution of effluent discharges than the northern outfall location.

This work was reported in the *Alternative Site Assessment – Numerical Modelling Report Near Field Dilution and Mixing* (MarCon 2012).

As seen from the hydrodynamic modelling work the critical factors to be considered in locating the discharge point are the available volume of water at the discharge point and dispersal/ circulation patterns of the discharged plume by tide and current.

It should be noted that the volume of treated wastewater to be discharged is 3.8m^3/s under the current proposal, with a potential future peak discharge of 5.9m^3/s.

Available Volume of Water for Initial Dilution

For the Proposed Project, discharging into the Irish Sea off the coast of north Dublin the biggest factor influencing the available volume of water is mean water depth. Mean water depths along the proposed outfall pipeline route (marine section) increase seawards, with depths greater than 10m achieved approximately 3,000m from Portmarnock Strand. This point approximates the western boundary of the Rockabill to Dalkey Island SAC. The preferable discharge locations in the southern outfall study area are all located east of this point (refer to Diagram 5-4).

Therefore, in order to achieve adequate dilution of the discharge, irrespective of what the final treated wastewater concentrations are, the final discharge point should be located within this area.

Tide and Current Patterns

Modelling of the discharge from the proposed long sea outfall discharge point predicts an imperceptible impact on the receiving waters from the proposed operation of the proposed outfall pipeline route (marines section) discharge point.

Phase 1 modelling also indicated that outfall locations west of Ireland's Eye in the southern outfall study area would have unacceptable levels of impact on environmentally sensitive areas in the study area such as Baldoyle Bay SAC/SPA, Sutton/Burrow Beach, Velvet Strand, Malahide Estuary, Malahide Beach, and Ireland's Eye SPA. Refer to Diagram 5-2 for example of extent of predicted impacts.

Examination of tide and current patterns in this area as predicted by the Proposed Project model and information supplied by Howth Yacht Club suggest that there is potential for material discharged west of Ireland's Eye to remain circulating within the area west of Ireland's Eye rather than disperse in to the broader body of the Irish Sea. Nutrients

in a treated wastewater discharging west of Ireland's Eye could therefore accumulate within Baldoyle Bay Estuary leading to algal blooms and eutrophication.

Ultraviolet treatment would also have to be provided to treated wastewater discharging west of Ireland's Eye to protect the bathing waters at Portmarnock (Velvet) Strand from microbial contamination as a result of the circulating current patterns.

For those reasons, a discharge point east of Ireland's eye is the preferred option.

Impact on Fishing & Potential Hazard to Navigation

The proposed outfall pipeline route (marine section) will require a diffuser section, incorporating diffuser valves, to aid the dispersion of treated wastewater into the surrounding sea. These diffuser valves rise to approximately 2.0m above the seabed. As the seabed, west of Ireland's Eye is fished (by dredging) for razor clams, the exclusion zone required to protect diffuser valves located in this area would impact on this fishing.

For added protection from the fishing activities protective structures, such as illustrated in Diagram 5-5 would have to be placed around the diffuser valves. Due to the shallow depth of water in the area west of Ireland's Eye these protective structures would pose a potential hazard to navigation in these waters.

For those reasons, a discharge point east of Ireland's eye is the preferred option.

Diagram 5-5: Precast Concrete Protection to Diffuser Valve

Risk of Plant Failure

The 2014 EIAR Directive requires consideration of Risk of Major Accidents or Disasters to be undertaken. A discharge of untreated wastewater resulting from a partial/total failure of the proposed WwTP is considered to fall into this category. A modelling scenario to assess the impacts of discharging untreated effluent over a three-day period through the proposed outfall pipeline route (marine section), simulating a process failure at the proposed

WwTP, was undertaken for the EIAR. The model predicts that there would be an Imperceptible impact on the environmentally designated sites or bathing waters in the area from such a discharge from the proposed long sea outfall.

However, a discharge of untreated wastewater through an outfall point located west of Ireland's Eye would have a significant impact on Portmarnock Strand and Baldoyle Estuary and other sensitive areas. This is demonstrated in Diagram 5-2 above, where the comparative concentrations of the discharged wastewater are indicated. This is due to the recirculation of flows in the area west of Irelands Eye.

For those reasons, a discharge point east of Ireland's eye is the preferred option.

Conclusion

A WwTP providing 'secondary' treatment, as defined by the UWWT Regulations, with a discharge point for the treated wastewater located approximately 1km north-east of Ireland's Eye will enable all water quality objectives of the receiving waters to be achieved.

A short outfall located in waters west of Ireland's Eye would present significant environmental impact, as illustrated in Diagram 5-2 above, resulting primarily from reduced volumes of available water to aid initial dilution of the treated wastewater and local circulating current patterns.

The EIAR and NIS have concluded that there are no significant residual impacts on the environment from the construction and operation of the proposed long sea outfall pipeline route (marine section).

5.8 Consideration of Potential for Reuse of Treated Wastewater

During the public consultation periods undertaken to date for the Proposed Project, a number of submissions were received requesting consideration be given to the potential for reuse of treated wastewater, specifically mentioning that the reuse of treated wastewater from the proposed WwTP could reduce the volume of treated wastewater discharged to the marine environment and also reduce the future water needs of the GDA.

An assessment of the potential for reuse of treated wastewater from the proposed WwTP was therefore undertaken through consideration of the following:

- Terminology associated with treated wastewater reuse;
- Types of reuse applications;
- European and global policy;
- Water scarcity and use – the case for reuse of treated wastewaters;
- Current status of treated wastewater reuse in Europe and globally;
- Required quality and technology implications;
- Planning and management considerations;
- Public acceptance; and
- Specific assessment of potential for reuse with respect to treated wastewaters from the proposed WwTP.

This report provided an overview of treated wastewater reuse policy, practice and aspects in the European and global context and concluded that, in the context of the potential for reuse of treated wastewater from the proposed WwTP:

- EU and resulting Irish legislation and policy currently lacks explicit direction or guidelines with regards to treated wastewater reuse. However, there are global examples of reuse projects in water-deprived regions (e.g. Middle East and North Africa) which could be used as reference if a water reuse scheme was considered viable. However, prior to consideration of any water reuse scheme, standards and guidelines for water reuse would have to be developed with the EPA and other key stakeholders;
- While treated wastewater from the proposed WwTP of secondary-treatment quality is of suitable quality for marine outfall discharge to the Irish Sea, it will not be suitable for potential reuse applications without additional treatment, with the possible exception of limited industrial reuse applications. At a minimum, disinfection is likely to be required, and in most reuse applications, advanced treatment will be necessary;
- Significant investment in treated wastewater distribution networks and associated infrastructure would be required; and
- Public perception is likely to limit the potential for any reuse scheme with a key public element, and significant public education and stakeholder engagement would be required.

Full details of this assessment are available in the report *entitled Assessment of Potential for Reuse of Treated Wastewater from Proposed Regional WwTP* (Jacobs Tobin 2017), which is appended as Appendix A5.1.

5.9 Regional Biosolids Storage Facility

5.9.1 Do-Nothing Scenario

Biosolids from Ringsend WwTP are currently stored at a facility in Thornhill Co. Carlow. Truck movements from the Ringsend plant are via the port tunnel, along the M50 and south along the M7. The biosolids are then applied to agricultural lands located in South Leinster and parts of Munster. Land spreading occurs mainly during the spring and autumn periods. Land spreading of biosolids is regulated by the Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 (SI 148 of 1998).

The Thornhill facility has a certificate of registration from Carlow County Council for a maximum annual throughput of 25,000 tonnes of biosolids. While there is theoretically some headroom, this would be insufficient to cater for the current Ringsend WwTP upgrade proposal, and the Proposed Project WwTP.

In September 2016, Irish Water published the National Wastewater Sludge Management Plan (NWSMP) (Irish Water 2016) which sets out its strategy to ensure a nationwide standardized approach for the management, treatment, storage and disposal of wastewater sludge over the next 25 years. Following the examination of current practices and disposal alternatives, the NWSMP concluded that the re-use of biosolids as a fertiliser to be spread on agricultural land is the most sustainable disposal route. The Plan considered the requirements for seasonal storage of treated sludge and states that, *"where appropriate, sludge storage facilities will be developed to serve a number of local plants and/or a wider regional need"*. It further noted that the upgrade to the Ringsend WwTP and the Proposed Project WwTP will result in a significant increase from current sludge volumes with a consequent increase in storage requirements. It recommends that a dedicated sludge storage facility should be developed in

conjunction with the construction of the Proposed Project WwTP and the expansion of Ringsend WwTP to meet its requirements and take account of other future needs in the region.

Having regard to the foregoing, it is evident that the 'Do-Nothing Scenario' is not viable and that alternative plans need to be advanced to cater for future requirements. The Applicant considers that the new proposed RBSF represents a sustainable solution for the seasonal storage of biosolids, arising from the Ringsend WwTP and the Proposed Project WwTP. It is proposed to transition to the use of the RBSF on a phased basis if and when the RBSF is permitted by ABP, constructed and available for use.

5.9.2 Biosolids Disposal Alternatives

The NWSMP examined current international and Irish practices for biosolids use and disposal. It identified a number of disposal routes as follows:

Reuse in Agriculture

Up to 98% of Irish wastewater sludges are beneficially reused in agriculture. This involves the beneficial re-use of biosolids as a fertiliser in agriculture and is considered a favourable environmental option. The Plan examined the available suitable spread-lands and confirmed sufficient availability for the foreseeable future. The use of properly treated wastewater sludge, in accordance with a nutrient management plan under the Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 (S.I. No. 148 of 1998), can avoid any adverse environmental impact on receiving waters as the quantity of phosphorus is monitored and controlled to match the quantity required by the crop being grown. The use of digested sludge in particular has been shown to improve nitrogen uptake in plants. The organic content and slow release nature of wastewater sludge compared to artificial fertiliser has added benefits in improving the condition of soil and reducing the potential for run-off of nutrients.

Reuse in Non- Agricultural Land

There are options for reuse of wastewater sludge in non-agricultural land. This includes use in energy crops, forestry and land remediation. There are limited ongoing options for both forestry and land remediation. The Plan recommended that this is reviewed on an ongoing basis to identify potential outlets.

Thermal Processes

The main alternative outlet for wastewater sludge internationally is incineration. Other thermal processes, including gasification and pyrolysis, are currently being developed internationally and are expected to be available on a commercial scale in the next 5-10 years. There are significant capital and operating costs associated with all thermal processes and as such they are only likely to become a preferred option if reuse in agriculture or non-agricultural land use are not available.

Landfill

The use of landfill for disposal of wastewater sludge is effectively banned by the Landfill Directive due to the requirement to set limits on the acceptance of biodegradable organic waste. Landfill is no longer considered to be a sustainable outlet for wastewater sludge and will only be considered as a short-term emergency outlet where reuse options are not available.

Other

Other options are available, include use in energy crops, silviculture and land remediation. However, development of these outlets has been limited both in Ireland and internationally.

The draft NWSMP was subject to full Appropriate Assessment (AA) and Strategic Environmental Assessment (SEA). The final published NWSMP incorporates the recommendations and mitigation measures arising therefrom. In view of the foregoing, it is Irish Water's policy to continue with beneficial re-use in agriculture as the favoured route for the disposal of biosolids in accordance with the NWSMP. Land spreading of biosolids is discussed in Volume 4 Part A, Section 19 of this EIAR.

5.9.3 Alternative Regional Biosolids Storage Facility Sites

Before arriving at its preferred approach to meeting sludge storage needs, the Applicant considered the findings of the NWSMP and considered further options as follows:

Provision of Off-Site Storage Facilities Serving Individual Wastewater Treatment Plants

This approach would go against the principle of the NWSMP of developing strategic facilities that serve a number of plants. It would contradict the principle of increasing operational efficiency as a number of individual facilities would require more investment and more resources. The management and control of facilities to the highest standards is best achieved through a small number of strategic regional, highly controlled facilities rather than a large number of smaller facilities.

Provision of Off-Site Storage Facilities Serving Groups of Wastewater Treatment Plants (Located Close to the Spread-Lands)

This option does not provide flexibility for changes to the spread-lands location or for changes to the future disposal outlet.

Provision of off-site storage facilities serving groups of wastewater treatment plants (located close to the source)

This is the preferred approach as it achieves greater capital and operational efficiencies, facilitates high standards of management and control and restricts the number of developments required in various locations. This approach also allows for flexibility in the future to changes in the location of the spread-lands or to the changes to the disposal route.

Having reviewed the foregoing, the decision was taken to locate a single RBSF site with sufficient area to cater for the biosolids arising from a projected 3.6m PE from the GDSDS region by 2050. However, planning would be advanced based on a 3m PE requirement to cater for the arisings from Ringsend and the proposed GDD to 2040. A generic design of the proposed RBSF required a site area of approximately 5.5 hectares. As it was quite unlikely that such an 'ideally' sized perfectly rectangular site would be located, and to provide layout flexibility and buffering to minimise potential environmental impacts (particularly on sensitive receptors), it was proposed for site selection purposes to seek site locations where a minimum usable area of 8 hectares was available. Further, it was decided to look for suitable sites within the GDSDS region using the following broad criteria:

- **Suitably zoned lands:** The GDSDS boundary includes the administrative area of seven local authorities, including Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire

Rathdown County Council (the four Dublin Authorities) together with parts of counties Meath, Kildare and Wicklow. The development plans of all seven authorities were examined to determine where such a facility may be acceptable from a zoning perspective. This was followed with consultations with the Planning departments from each local authority. A detailed analysis of planning policies, objectives and standards together with environmental, economic and social and community considerations was completed to further refine the selection process. All the authorities directed the Applicant to Industrial zoned land;

- **Colocation of the storage facility with other waste facilities**: As per the objectives of the Eastern and Midlands Regional Waste Management Plan (EMRWMP), this option was considered where there are existing waste facilities within the GDSDS area;
- **Irish Water and Ervia owned lands**: Ervia and Irish Water landbanks within the GDSDS area were considered to determine if there are any potential suitable locations for the proposed facility; and
- **Onsite storage at WwTPs**: The Ringsend WwTP could not accommodate additional storage facilities on the scale required. Colocation with other wastewater treatment plants within the GDSDS was also considered.

A three-stage site selection process was completed in order to identify the preferred site. At each stage, a detailed report was published and stakeholder observations sought. All feedback was duly considered and used to inform the decision-making process. The site selection process is shown graphically as a Project Development Roadmap in Diagram 5-6 while all relevant reports are included in Appendices 4D, 4E and 4F in Volume a Part B of this EIAR. The process is summarised hereinafter.

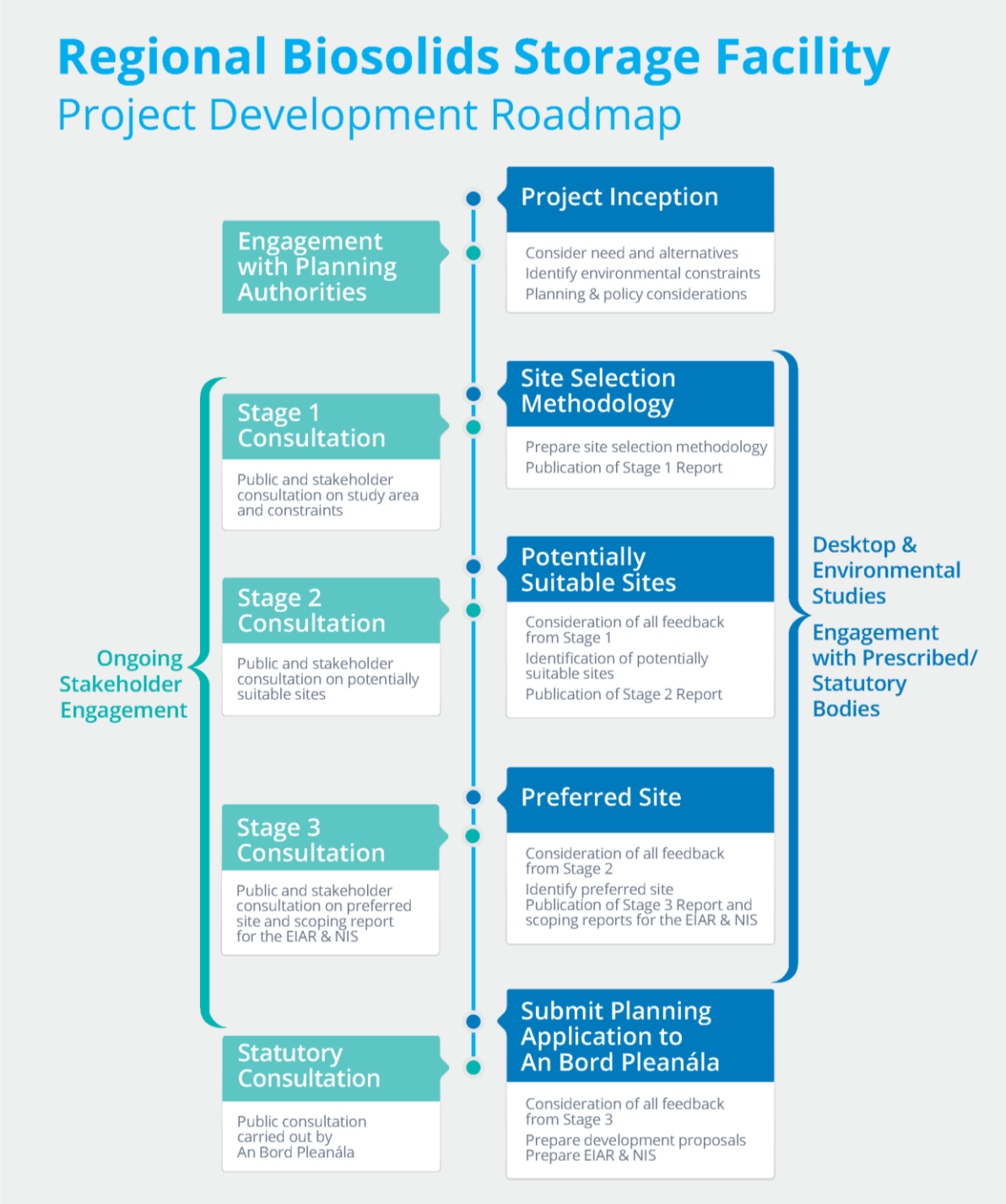

Diagram 5-6: Regional Biosolids Storage Facility Roadmap

A Stage 1 non-statutory consultation on the proposed RBSF site selection methodology was conducted from 2 February 2017 to 2 March 2017. This coincided with the publication of *Stage 1 Report – Site Selection Methodology*. A total of 64 submissions were received from public bodies and the public generally. Observations were made on the appropriate zoning for sites, biosolids re-use including environmental concerns regarding land spreading, risk of odours and alternative approaches to biosolids reuse in agriculture. All these were considered in the next stage of the process.

A *Stage 2 Report – Identification of Preferred Sites* was published on 11 May 2017. This report outlined an eight-stage shortlisting phase whereby five potential sites were shortlisted. These sites are shown in Diagram 5-7 together with the various sites considered in the site selection process.

The 5 shortlisted sites were as follows:

- Bracetown/Gunnocks, Co Meath: This is a 12.5 ha site located to the north of Dunboyne and easily accessible from the M3 Motorway;
- Gunnocks, Co Meath: This is a 14.5 ha site located north of Dunboyne, directly south of the previous site. It is likewise easily accessible from the M3 Motorway;
- Greenogue, County Dublin: This is a 12.5ha site located off the M7 Motorway, west of Rathcoole in South Dublin;
- Newtown/Kilshane, Dublin 11: This is a 11.0 ha site located off the N2/M2 Motorway near Kilshane Cross in Fingal. This site has been previously partially developed as a waste management/recycling facility; and
- Kilshane, Dublin 11: This is a 11.3 ha site located just north of the previous site. It is likewise accessible from the N2 Motorway.

Irish Water undertook a Stage 2 non-statutory consultation over a 5-week period from 11 May 2017 to 15 June 2017. The consultation phase included 3 open days at venues located close to the potential sites. A total of 499 stakeholders and organisations participated by attending the open days or making submissions. Observations were made on the appropriate zoning for the sites, biosolids re-use including environmental concerns regarding land spreading, site selection methodology, risk of odours, public health concerns, traffic concerns in the vicinity of the sites and alternative approaches to biosolids reuse in agriculture. These observations were considered as part of the final site selection process.

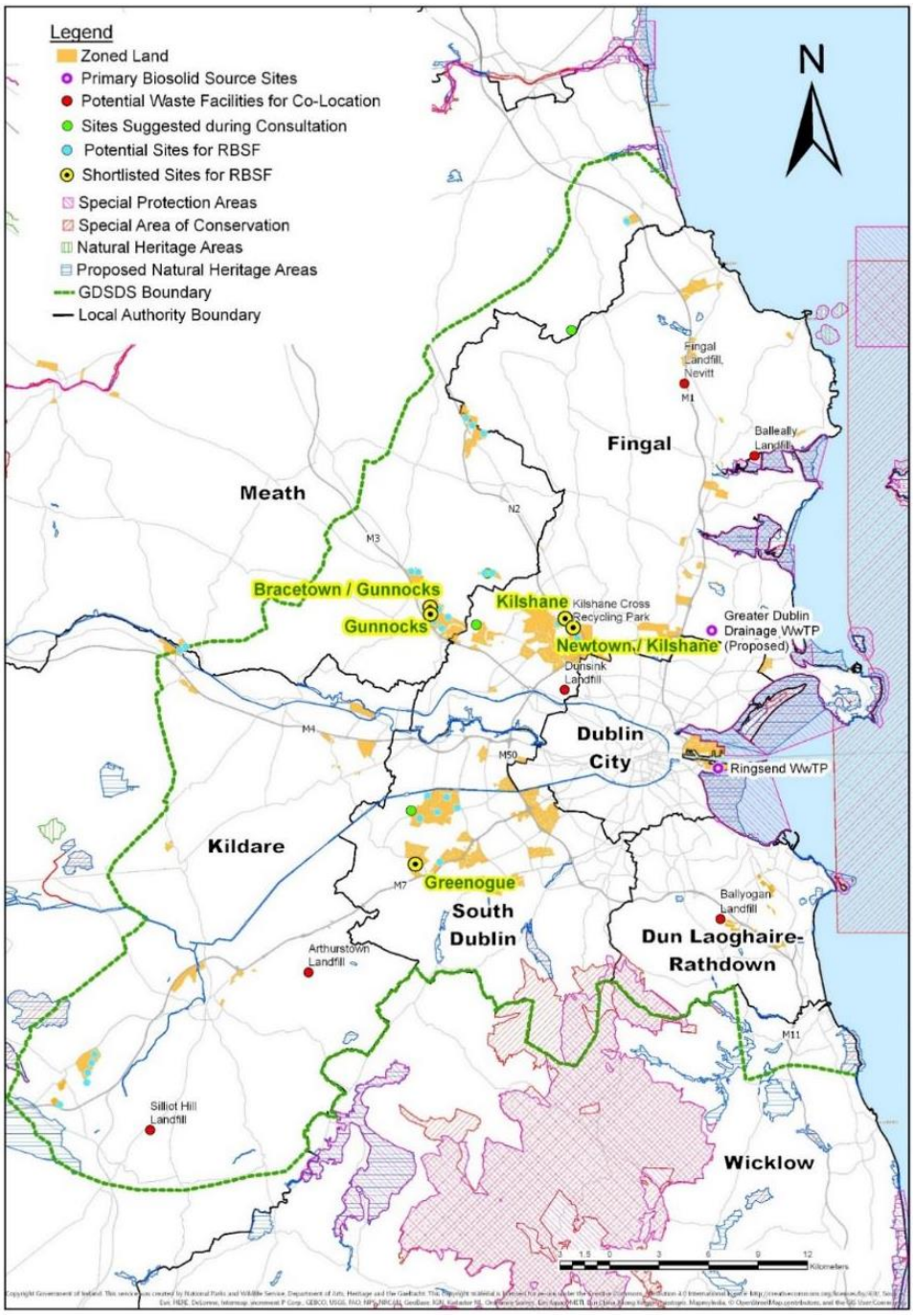

Diagram 5-7: Potential Site Locations

Under the *Stage 3 Report – Identification of Preferred Site*, the 5 potential sites proceeded to a detailed assessment phase in accordance with Environmental, Economic & Engineering, Planning and Social & Community criteria with a view to identifying a preferred site. The 5 sites were duly compared under 21 criteria. For each criterion, a qualitative approach was adopted and therefore, expert judgement was applied with the following classification adopted to compare the specific sites relative to each other as shown in Diagram 5-7.

The selection of the final preferred site was based on a cumulative consideration of the classifications. From this assessment, the preferred site was selected as the Newtown/Kilshane[1] site, the site now proposed for the RBSF Component of the Proposed Upgrade Project. The advantages of the site were summarized as follows:

- The proposed RBSF would be considered as Permitted in Principle in the Fingal Development Plan (FCC 2017);
- The site has been partially developed for what was intended to be a waste facility for construction and demolition waste, wastewater sludge treatment, biological waste treatment and waste transfer for municipal waste;
- There are existing roads, site services and fencing from this past development, some of which can be incorporated into the proposed development of the RBSF;
- The separate routes to and from the site provides advantages in relation to traffic management and traffic safety;
- The site is located in an existing industrial and infrastructural setting, which includes a quarry and electricity power station. This is the landscape backdrop when the site is viewed from the N2 National Road. Nevertheless, the site presents a good opportunity for incorporation of landscape measures for mitigation; and
- The population within 500m of the site is estimated to be less than 30 and the nearest schools are more than 2km to the east of the site. There are no hospitals near the site.

[1] 'Newtown/Kilshane' is the name attributed during the site selection process to the site in Newtown, Dublin 11, which is now the proposed location for the RBSF Component of the Proposed Upgrade Project.

Criteria	Site	Bracetown / Gunnocks (Meath)	Gunnocks (Meath)	Greenogue (South Dublin)	Newtown / Kilshane (Dublin 11)	Kilshane (Dublin 11)
Environmental	Air Quality	●	●	●	●	●
	Odour	▼	▼	▼	●	●
	Noise	●	●	▼	▲	●
	Landscape & Visual	●	▼	●	▲	▼
	Geology & Hydrogeology	●	●	●	●	●
	Hydrology	●	●	▼	▲	▲
	Ecology	●	▼	●	▲	●
	Archaeology, Cultural & Architectural Heritage	●	▼	▼	▲	▼
Economic & Engineering	Traffic	●	●	▼	●	▼
	Road Safety	●	●	●	▲	▼
	Service & Utility Connections	▼	▼	●	▲	▼
	Geotechnical	●	●	●	▼	●
	Distance from Biosolids Source	●	●	●	▲	▲
	Capital & Operating Costs	●	▼	●	▲	●
Planning	Land Use Zoning	●	●	▲	▲	▲
	Planning Policies & Objectives	▼	▼	●	▲	●
	Planning History & Current Usage	●	●	●	▲	●
	Population & Sensitive Receptors	●	●	▼	●	●
	Adjacent Land Use	●	●	●	●	▲
Social & Community	Material Assets	●	●	●	●	▼
	Neighbourhood Character	●	●	●	●	●

Legend: ▲ **More Favourable** ● **Neutral** ▼ **Less Favourable**

Diagram 5-8: Assessment Criteria and Corresponding Assessment Classifications

The selected site was the subject to a 6 week Stage 3 non-statutory consultation period from 29 August 2017 to 10 October 2017, which sought the views of stakeholders on the contents of the Stage 3 Report. A Scoping Report for the EIAR and the Natura Impact Statement for the site was also published and observations sought as an integral

part of the Stage 3 consultation process. An open day was held on 12 September 2017 at the White House Hotel, Co Dublin. A total of 90 individuals and organisations participated by attending the open day or making written submissions. Concerns were expressed concerning traffic, odour control, visual appearance and community gain. A Stage 3 Consultation Report on these submissions is included Appendix 2E. The feedback received is reflected in the facility design and the environmental mitigation proposed.

5.9.4 Design and Site Layout Alternatives

There are a number of constraints which limit the options for the siting of the individual buildings on the site. The preferred site has been partially developed as a waste recycling facility and significant site development works were completed in 2009 prior to the project being abandoned. Because of the similarity between the proposed use and the previous plans, it is proposed to salvage and re-use as much of the installed infrastructure as possible. This includes utility services, roads, site entrance, etc. Some of the other infrastructure, such as small buildings, will require demolition. An over-riding requirement is to provide for adequate transport vehicle circulation within the site while removing the risk of queuing onto the public road. Additional site constraints include the proximity to one dwelling and overhead high voltage electricity cables traversing the site. The proposal to capture solar energy as a sustainable way to operate the facility means that the buildings are best configured in an east west orientation in order to maximise photo voltaic cell efficiency. A final constraint relates to the need to provide for phased development to match the storage needs while future proofing the site to provide for possible future expansion, subject to planning approval.

Having regard to the foregoing, there is limited scope in terms of site layout alternatives. However, the following alternatives were considered:

- Storage building in a North South configuration: Considered to have negative landscape implications, did not suit solar energy capture and did not easily facilitate staging;
- Storage buildings in a chevron formation: Poor site circulation, less re-use of existing infrastructure and sub-optimal from a solar energy perspective; and
- Storage buildings in an East West configuration: The chosen site layout.

The selected site layout was considered to be the best overall fit having regard to the various site constraints.

5.9.5 Regional Biosolids Storage Facility Conclusion

The requirement for biosolids storage arises primarily from the statutory restriction on land spreading between 12 October and 15 January. Further, the principal re-use in agriculture is as a fertiliser for feed grain crops. Accordingly, spreading occurs in the spring and autumn sowing seasons which indicates a requirement for 4 months storage capacity. Limitations on the existing storage facility for biosolids from the Ringsend WwTP coupled with the requirements of the NWSMP lead to the requirement to locate a RBSF in the GDSDS region. Accordingly, Irish Water undertook a 9 month three stage site selection process to identify a preferred site. This incorporated a robust consultation process whereby the feedback from each stage was used to inform and shape the next stage. The preferred site was accordingly identified as an 11ha site at Newtown, Dublin 11. This site is in the ownership of Fingal County Council and had previously been partially developed as a waste recycling facility. The proposed repurposing of the site as an RBSF is compatible with the current *Fingal Development Plan* (FCC 2017) zoning,

waste management policies and the NWSMP. The site is particularly suitable from a transportation perspective in catering for biosolids from both the Proposed Project WwTP and the Ringsend WwTP.

5.10 Conclusion

It has been established above that the Proposed Project in its entirety has been the subject of a systematic, authoritative and comprehensive consideration of alternatives.

A significant range of alternatives has been considered during strategy development, strategic environmental appraisal and site selection. The consideration of these alternatives was informed, authoritative, rational and robust. The assessment took account of land use, planning and environmental impacts at appropriate stages. In our view, the resultant examination of alternatives presented above not only meets but exceeds the requirements of the Planning and Development Regulations 2001 to 2016 and Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive) to provide '*a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.*'

5.11 References

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