AQUIND Limited

AQUIND INTERCONNECTOR

Environmental Statement – Volume 1 – Chapter 27 Waste and Material Resources

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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27. WASTE AND MATERIAL RESOURCES

27.1. SCOPE OF THE ASSESSMENT

27.1.1. INTRODUCTION

27.1.1.1. This chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Development upon Waste and Material Resources. The Proposed Development that forms the basis of this assessment is described in Chapter 3 (Description of the Proposed Development) of the Environmental Statement ('ES') Volume 1 (document reference 6.1.3).

27.1.1.2. The Waste and Material Resources assessment has considered the potential impacts associated with the following activities:

- The consumption of materials and products (from primary, recycled or secondary and renewable sources, and including materials offering sustainability benefits), as well as the generation and use of arisings recovered from the whole Proposed Development as defined in Chapter 3 (Description of the Proposed Development) including the Converter Station, the Onshore Cable Corridor, the Marine Cable Corridor; and
- The production and disposal of waste to landfill for the whole Proposed Development.

27.1.1.3. This chapter assesses the impacts arising from the Proposed Development within the Onshore Components of the Order Limits and the Site only (above Mean Low Water Springs ('MLWS')). Refences to the Order Limits and the Site in this chapter, any appendices to it and plans enclosed to it, is only in relation to the Order Limits and the Site as applicable to the Onshore Components as illustrated in Figure 3.9 of the ES Volume 2 (document reference 6.2.3.9) Figure 3.9.

27.1.2. STUDY AREA

27.1.2.1. Two study areas are defined for waste and material resources. The study areas set out are proportionate to the assessment of material resource consumption, arisings and waste disposal to landfill for the Proposed Development, and the impact these elements will have on regional availability of material resources and waste infrastructure capacity. The study area approach is based on guidance set out in IAN 153/11 Environmental Assessment of Material Resources (Highways England, 2011), supplemented with detail from industry best practice.

27.1.2.2. The primary study area in respect of the waste and material resources assessment comprises all development shown within the Order Limits (see Figure 3.2), as described in Chapter 3 (Description of the Proposed Development). This will comprise:

- Section 1 – Lovedean (Converter Station Area). The Converter Station, including two Telecommunications Buildings, the Access Road and other infrastructure as described in Chapter 3 (Description of the Proposed Development).
- Sections 2 to 10 – the Onshore Cable Corridor. The cables will be installed in trenches or in some areas using Horizontal Direction Drilling ('HDD') or an alternative Trenchless technique. Up to two Optical Regeneration Station(s) ('ORS') will also be present at Section 10 (Eastney (Landfall)). These are outlined in more detail in Chapter 3 (Description of the Proposed Development).
- Marine Cable Corridor. The HVDC Marine Cables and FOCs will be laid from UK Mean High Water Springs ('MHWS') out to the UK Exclusive Economic Zone ('EEZ').

27.1.2.3. The secondary study area extends to the construction materials and capacity of recycling and waste management infrastructure within South East England (comprising the counties of Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, London, Oxfordshire, Surrey and West Sussex). The secondary study area for materials is both regional (South East England) and national (UK).

27.2. LEGISLATION, POLICY AND GUIDANCE

27.2.1.1. This assessment has taken into account the following current legislation, policy and guidance relevant to Waste and Material Resources.

27.2.2. LEGISLATION

Waste Framework Directive (2008/98/EC)

27.2.2.1. The Waste Framework Directive (European Comission, 2008) provides a common definition of waste as *"any substance or object that the holder discards or intends to or is required to discard"*. It is important to note that the definition of 'discard' set out in the Waste Framework Directive is different to its dictionary definition: The Directive definition includes any substance or object that is discarded for disposal or that has not been subject to acceptable recovery (including recycling). The framework also provides explicit targets for construction, demolition and excavation wastes: 70% of non-hazardous construction and demolition waste must be recovered, reused or recycled by 2020. The Waste Hierarchy is set out in the framework (Plate 27.1). The main principles of the Waste Hierarchy are (Defra, 2011):

- Prevention - using less material in design and manufacture; keeping products for longer; re use; using less hazardous materials;

- Preparing for reuse - checking, cleaning, repairing, refurbishing, whole items or spare parts;
- Recycling - turning waste into a new substance or product; includes composting if it meets quality protocols;
- (other types of) Recovery - anaerobic digestion; incineration with energy recovery; gasification and pyrolysis which produce energy (fuels, heat and power); recovering materials from waste; some backfilling; and
- Disposal - landfill and incineration without energy recovery.

Plate 27.1 – Waste Hierarchy

The Waste (England and Wales) Regulations 2011

27.2.2.2. The Waste (England and Wales) Regulations (HM Govenment, 2011) implement the Waste Framework Directive. These Regulations stipulate the requirement for industry and businesses to implement the Waste Hierarchy.

The Controlled Waste (England and Wales) Regulations 2012

27.2.2.3. The Controlled Waste (England and Wales) Regulations (HM Government, 2012) provides a definition of controlled waste and classifies waste as household, industrial or commercial waste.

The Hazardous Waste (England and Wales) Regulations 2005

27.2.2.4. The Hazardous Waste (England and Wales Regulations (HM Government, 2005) introduces measures to control the storage, transport and disposal of hazardous waste. It provides a means to ensure that hazardous waste and any associated risks are appropriately managed.

Environmental Protection Act 1990

27.2.2.5. The Environmental Protection Act (HM Government, 1990) outlines the requirement of the manager of a development to ensure that any excess materials or waste as a result of construction activities are recovered or disposed of without any subsequent adverse effects upon the surrounding environment.

Environment Act 1995

27.2.2.6. Part 5 of the Environment Act 1995 (HM Government, 1995) amends the Environmental Protection Act 1990 by requiring the Secretary of State to prepare a strategy containing policies in relation the recovery and disposal of waste in England and Wales - The National Waste Strategy: England and Wales (refer to Our Waste, Our Resources: A Strategy for England summarised below).

27.2.2.7. Part 5 of the Environment Act 1995 also allows the Secretary of State to set out regulations for imposing producer responsibilities obligations to increase the re-use, recovery or recycling of products or materials and make provisions for identifying offences.

27.2.2.8. Finally, Part 5 of the Environment Act 1995 and accompanying Schedules 13 and 14 sets out the review process for the mineral planning authority for mineral planning permissions.

Clean Neighbourhoods and Environment Act 2005

27.2.2.9. The Clean Neighbourhoods and Environment Act (HM Government, 2005) states that it is the responsibility of construction workers on site to guarantee that waste is disposed in the appropriate manner. In accordance with this, employees must undertake waste disposal activities as outlined in national law.

Control of Pollution Act 1974

27.2.2.10. The Control of Pollution Act (HM Government, 1974) makes provisions with respect to the generation and revision of 'waste disposal plans' and prohibits the unlicensed disposal of waste.

27.2.3. PLANNING POLICY

National Policy

National Policy Statement ('NPS')

27.2.3.1. In the s35 Direction Letter, the Secretary of State (SoS) directed that the Proposed Development was, by itself nationally significant and that the Overarching NPS for Energy (EN-1) (Department of Energy & Climate Change, 2011) should apply to the application as it would to a generating station of a similar generating capacity as the capacity of the interconnector. . NPS EN-1 makes reference to the waste hierarchy in order to implement sustainable waste management and minimise waste generation. Furthermore, NPS EN-1 requires the applicant to set out waste management arrangements and prepare a Site Waste Management Plan including

details on the proposed waste recovery and disposal system for all waste generated by the development, and an assessment of the impact of the waste on the capacity of waste management infrastructure.

National Planning Policy Framework

27.2.3.2. The National Planning Policy Framework (Ministry of Housing, Community & Local Government, 2019) ('NPPF') sets out policies for national construction minerals supply. It aims to facilitate the sustainable use of minerals (Chapter 17 of the NPPF), which are a finite natural resource, and can only be worked where they are found, as best use needs to be made of them to secure their long-term conservation. *"Planning policies should:*

- *provide for the extraction of mineral resources of local and national importance, but not identify new sites or extensions to existing sites for peat extraction;*
- *so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously."* (Chapter 17, paragraph 204).

Our Waste, Our Resources: A Strategy for England

27.2.3.3. Our Waste, Our Resources: A Strategy for England (Defra, 2018) sets out how the Government will preserve stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. The strategy also outlines the Government's aims to minimise the damage caused to the natural environment by reducing and managing waste safely and carefully, and by tackling waste crime. It combines actions to take now with firm commitments for the coming years and gives a clear longer-term policy direction in line with the 25 Year Environment Plan (Defra, 2018).

25 Year Environmental Plan

27.2.3.4. The 25 Year Environment Plan (Defra, 2018) set out government actions to improve, regain and retain the natural word. The Plan sets out high level goals, which includes *"using resources form nature more sustainably and efficiently"* and *"minimising waste"* (Our 25-year goals, page 10).

27.2.3.5. Chapter 4: Increasing resource efficient and reducing pollution and waste seeks to:

- *"Make sure that resources are used more efficiently and kept in use for longer to minimise waste and reduce its environmental impacts by promoting reuse, remanufacturing and recycling.*

- *Work towards eliminating all avoidable waste by 2050 and all avoidable plastic waste by end of 2042."* (Chapter 4 of the NPPF, page 83).

27.2.3.6. Achievement of the Plan ambitions requires a *"move towards a regenerative, circular economy"* through, for example *"the wastes or by-products of one [industrial facility or company] become the raw materials of another"* (Chapter 4 of the NPPF, page 84).

27.2.3.7. In relation to waste elimination, the plan sets out to *"reduce the demand for single use plastic"* and *"make it easier for people to recycle"* (Chapter 4 of the NPPF, page 88).

The National Planning Policy for Waste

27.2.3.8. The National Planning Policy for Waste (Ministry of Housing, Communities & Local Government, 2014) outlines the ambition to promote a sustainable and efficient approach to resource use and management. It sets out waste planning policies including the delivery of sustainable development and resource efficiency. The policy also states that when determining planning applications for non-waste development, local planning authorities should ensure that the impact on existing waste management facilities is acceptable and that waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal.

NPS for Hazardous Waste 2013

27.2.3.9. The NPS for Hazardous Waste (Defra, 2013) outlines the main objectives on Government Policy for hazardous waste, including:

- To protect human health and the environment: there are stringent legislative controls in place to control the management of waste with hazardous properties;
- Implementation of the waste hierarchy: This aids the production of less hazardous waste, promoting its reuse as a resource (where possible). Disposal of the waste is noted as a last resort; and
- Self-sufficiency and proximity: This ensures that sufficient disposal facilities are provided across country to match expected arisings of all hazardous wastes, except those produced in very small quantities, and to enable hazardous waste to be disposed of in one of the nearest appropriate installations.

27.2.3.10. The policy additionally outlines the key principles for the management of hazardous waste, as follows:

- Principle 1: Hazardous waste should be managed as to provide the best possible environmental outcome. This is expected to be in line with the waste hierarchy, with the exception of when life cycle analysis suggests that the best overall environmental option would require a departure from that hierarchy.

- Principle 2: Requires a reduction in reliance upon landfill, with landfill only being used where there is no alternative recovery or disposal option available.
- Principle 3: This principle requires that hazardous waste is not mixed with different categories of hazardous waste or with other waste substances or materials (although co-disposal of some wastes in landfill is allowed).
- Principle 4: Stipulates that organic hazardous wastes that cannot be reused, recycled or recovered should be subject to destruction using best available techniques, with energy recovery for all appropriate treatments. No hazardous organic waste should be landfilled unless the requirements of the Landfill Directive are met.
- Principle 5: The practice of relying on higher Landfill Directive waste acceptance criteria to enable some hazardous waste to continue to be landfilled must end.

The Waste Management Plan for England (Defra, 2013)

27.2.3.11. The Waste Management Plan for England (Defra, 2013) provides a detailed analysis of the present state of waste management at a national level, and assesses how the objectives of the Waste Framework Directive will be effectively supported. It states that excavation, construction and demolition waste is the largest contributor to total waste generation in the UK.

Regional Policy

South Inshore and South Offshore Marine Plan

27.2.3.12. The South Inshore and South Offshore Marine Plan (Marine Management Organisation, 2018) sets out the vision, objectives and policy for managing the resources, activities and interactions within the south marine plan area. In relation to mineral resource and waste, the following policies apply:

- Policy S-AGG-1: Proposals in areas where aggregate extraction is licenced shall not be authorised unless the development is compatible with aggregate extraction to safeguard aggregate extraction areas.
- Policy S-AGG-2: Proposals in areas subject to an Exploration and Option Agreement would not be supported unless the development is compatible with aggregate extraction to safeguard commercially viable aggregate resources.
- Policy S-AGG-3: Proposal in areas with high potential aggregate resources must demonstrate ability to avoid; minimise or mitigate significant adverse impacts on aggregate extraction to secure aggregate supply.
- Policy S-AGG-4: Proposals which require marine aggregates in their construction should preferably be sourced from the south marine plan area to encourage local sourcing.

27.2.3.13. In relation to waste, the following policy applies:

- Policy S-DD-1: Proposals within or adjacent to licenced dredging or disposal areas must demonstrate ability to avoid; minimise or mitigate significant adverse impacts on licenced dredging or disposal areas to avoid conflict with marine businesses.

Local Policy

Hampshire Minerals and Waste Plan

27.2.3.14. The Hampshire Minerals and Waste Plan (Hampshire Authorities, 2013) has been adopted by the local councils relevant to the Proposed Development (PCC, HBC, WCC and EHDC). This document sets out how mineral resources should be extracted and supplied and the necessary waste management infrastructure required so that Hampshire's environment will be protected, its communities maintained and the local economy supported. Key policies include:

- Policy 15: Safeguarding minerals resources. The policy seeks to ensure that strategic sites and/or capacity is protected.
- Policy 17: Aggregate supply – capacity and source. The policy set out the maintenance of strategic capacity to ensure aggregate production and supply is sufficient.
- Policy 18: Recycled and secondary aggregates development. The policy seeks to increase and maintain high quality recycled and secondary aggregate capacity.
- Policy 25: Sustainable waste management. The policy sets out to ensure recycling of non-hazardous wastes reaches 60% by 2020 through the application of the waste hierarchy, encouraging self-sufficiency and sharing of infrastructure.
- Policy 26: Safeguarding waste infrastructure. The policy seeks to ensure strategic sites and/or capacity are protected.
- Policy 30: Construction, demolition and excavation waste development. The policy proposes to increase high quality recycled and secondary aggregate capacity.

27.2.4. GUIDANCE

27.2.4.1. The following guidance has been used to produce this chapter:

- IAN 153/11 Guidance on the Environmental Assessment of Material Resources (Highways England, 2011) provides guidance for the assessment of the impacts and effects associated with the use of materials and generation of waste in new construction, improvement and maintenance projects. The document provides a definition of materials resources:

- *"the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Materials resources include primary raw materials such as aggregates and minerals, and manufactured construction products. Many material resources will originate off site, purchased as construction products, and some will arise on site such as excavated soils or recycled road planning's"*.

27.2.4.2. IAN 153/11 does not include a definition of waste; however, this is defined in the EU Waste Framework Directive.

27.2.4.3. The methodology adopted (as detailed in Section 27.4) has been augmented by professional judgement to reflect best practice.

27.2.4.4. The following guidance is applicable to the appointed contractors during construction and operation of the Proposed Development:

- CL: AIRE Definition of Waste Code of Practice (Environment Agency, n.d.) sets out good practice guidance when assessing whether excavated materials are classified as waste or not, and allows for the determination for when treated excavated waste can cease to be waste for a particular use.
- Waste Duty of Care: Code of Practice (DEFRA & Environment Agency, 2018) sets out practical guidance on how waste holders should implement and fulfil the waste duty of care requirements. This includes managing wastes, complying with environmental permit conditions, transfer of wastes and waste documentation.

27.3. SCOPING OPINION AND CONSULTATION

27.3.1. SCOPING OPINION

27.3.1.1. As detailed within Chapter 1 (Introduction) of the ES Volume 1 (document reference 6.1.1), a Scoping Opinion was received by the Applicant from PINS (on behalf of the SoS) on 7 December 2018 (Appendix 5.3 (EIA Scoping Opinion) of the ES Volume 3 (document reference 6.3.5.3). The following key points were raised in relation to Waste and Material Resources:

- The PINS Scoping Opinion, Appendix 5.3 (EIA Scoping Opinion), noted that the Waste and Materials Resources Chapter discussed onshore elements of the Proposed Development, and did not cover the marine aspects. This has been addressed within this chapter (Section 27.6) where potential impacts from the Converter Station, Onshore Cable Corridor and Marine Components are presented.
- The PINS Scoping Opinion, Appendix 5.3 (EIA Scoping Opinion), noted that the Waste and Material Resources aspect chapter of the ES should define what level of impact is deemed to be significant, where this differs from the overarching assessment methodology Opinion. This is addressed within the Assessment

Methodology (Section 27.3.5.3) which defines the sensitivity and magnitude thresholds, the significance of effects and which effects are deemed significant.

- The PINS Scoping Opinion, Appendix 5.3 (EIA Scoping Opinion), noted that where the ES relies upon mitigation secured through management plans, it should be clearly demonstrated where each measure is set out in the management plan, with cross referencing and draft copies of the management plan documents should be appended to the ES and/or demonstrated how they will be secured. This has been addressed through clear referencing within this chapter, and the production of an Onshore Outline CEMP ('Construction Environmental Management Plan') (document reference 6.9) which will be adopted by the contractor and refined for use.
- The PINS Scoping Opinion (Appendix 5.3 (EIA Scoping Opinion)) noted that the ES should specify types and volumes of waste with appropriate cross referencing to the Ground Conditions aspect chapter noting the potential for contaminated land within the vicinity of the Proposed Development. This has been addressed within Section 27.6.

27.3.1.2. Appendix 27.1 (Consultation Responses) of the ES Volume 3 (document reference 6.3.27.1) includes the responses to the PINS EIA Scoping Opinion.

27.3.2. STATUTORY CONSULTATION

27.3.2.1. Consultation on the PEIR was undertaken between February and April 2019.

27.3.2.2. The South Downs National Park ('SDNP') consultee noted concern about the frequent referral to the use of excavated material for landscaping bunds, which was considered to be out of character within the area and would not mitigate the impact of the Proposed Development. Reprofiling of landform will take place to provide some visual screening and utilise site fill, however the visual impact of such reprofiling has been considered, as detailed in Chapter 15 (Landscape and Visual Amenity) of the ES Volume 1 (document reference 6.1.15).

27.3.2.3. Appendix 27.1 (Consultation Responses) includes the responses to the PEIR consultation in relation to this topic and provides further detail on how these have been addressed.

27.3.3. POST PEIR CONSULTATION

27.3.3.1. No consultation further to the Statutory consultation on the PEIR has been undertaken for the waste and material resources assessment. As stated in 27.3.2.2, the issues raised through the statutory consultation response from SDNP have been discussed further with the Landscape and Visual Amenity specialists and Design Team, and responded to in Chapter 15 (Landscape and Visual Amenity). Further consultation in relation to the availability and consumption of material resources and the generation and disposal of waste in this context, has not, therefore, been deemed necessary.

27.3.4. ELEMENTS SCOPED OUT OF THE ASSESSMENT

27.3.4.1. The elements in Table 27.1 were not - as a result of the Proposed Development - considered to give rise to likely significant effects at Scoping, and have therefore been excluded from the ES, as agreed by the PINS Scoping Opinion response in Appendix 5.3 (EIA Scoping Opinion).

Table 27.1 – Topics and elements scoped out of the assessment at Scoping

Element Scoped Out	Justification
Lifecycle assessment (including embodied carbon and water) of materials and arisings, and waste	The effort and resources required to undertake a full lifecycle assessment of these elements are deemed disproportionate to the benefit they would offer the assessment of significance of effect.
Arisings and waste production beyond the first year of operation	The quantities of waste generated and disposed of beyond the first year of operation are considered to be minimal, and related to minor repairs and maintenance activities. As such, the impacts and associated effects are forecast to be not significant.
Material consumption and waste production during decommissioning	Assessing the impacts and effects of the decommissioning lifecycle stage of the Proposed Development has been scoped out of this chapter. Materials consumption, and arisings and waste during decommissioning have been scoped out, as their impacts and associated effects have been deemed to be not significant. Furthermore, the materials required for, and disposal routes of waste generated are not known as they are deemed to be too far into the future. Accordingly, this chapter and its assessment have

Element Scoped Out	Justification
	been produced on the presumption that, through the advancement of technologies and processes for reclaiming and recovering materials in the future the Proposed Development will take into account the increasing drive towards a circular economy and good and best practice techniques will be applied at end-of-life and adverse environmental effects will be duly minimise at this lifecycle stage.

27.3.5. IMPACTS SCOPED INTO THE ASSESSMENT

Construction Stage

27.3.5.1. The following impacts for the onshore and marine elements are considered to have the potential to give rise to significant effects during construction of the Proposed Development and have therefore been considered within the ES:

- The consumption of materials and products (from primary, recycled or secondary and renewable sources, including materials offering sustainability benefits (for example those that can be easily deconstructed or demounted, and re-used at end of first life)), across the whole Proposed Development (the Converter Station, the Onshore Cable Corridor and the Marine Cable Corridor) during the Construction Stage; and
- The production, management and potential disposal of waste for the whole Proposed Development during the Construction Stage.

Operational Stage

27.3.5.2. The following impacts are considered to have the potential to give rise to significant effects during the Operational Stage of the Proposed Development and have therefore been considered within the ES:

- The consumption of materials and products (from primary, recycled or secondary and renewable sources, including materials offering sustainability benefits (for example those that can be easily deconstructed or demounted, and re-used at end of first life)), across the whole Proposed Development (the Converter Station, the Onshore Cable Corridor and the Marine Cable Corridor) during the Operational Stage; and
- The production, management and potential disposal of waste for the whole Proposed Development during the first year of operation. An assessment of the first year of operation for the generation of waste arisings is considered to be the only operational year during which the potential for significant adverse effects from waste generation is likely.

27.3.5.3. Since PEIR consultation, the scope of the Waste and Materials Resources chapter has altered, to include the consumption of materials during the operational lifespan. Previously, only the first year of operation had been scoped in; however; as the design of the Proposed Development evolved, the requirement (and associated data) for material resource consumption during operation has become known, and therefore included in the assessment.

27.4. ASSESSMENT METHODOLOGY

27.4.1.1. The assessment methodology used in this chapter is based on guidance set out in IAN 153/11 Environmental Assessment of Material Resources (Highways England, 2011), supplemented with detail from industry best practice. This approach is considered to represent current best practice and utilises available published UK guidance for the assessment of waste and material resources at the time of writing. With a primary focus on reducing the impacts and effects of materials used for, and waste generated by, construction activities in the highways sector, it is the professional judgement of the author of this chapter that IAN 153/11 is appropriate for use on the Onshore Cable routing elements of the Proposed Development. The general ethic and principles of the guidance are also applicable to the proposed Converter Station and Marine Cable Corridor to assess the availability of bulk materials for construction and generation and disposal of waste arisings.

27.4.1.2. In accordance with IAN 153/11, a detailed assessment is considered suitable for complex capital maintenance projects, improvement and larger new construction projects. Given the scale and nature of the Proposed Development, a detailed assessment has therefore been considered appropriate.

27.4.1.3. The methodology has been used to assess the effects of the consumption of materials (including the production and use of arisings), and the generation and disposal of waste associated with the Proposed Development.

27.4.1.4. Only the direct impacts associated with material resource consumption and generation and disposal of waste are assessed within this chapter. Indirect impacts relevant to the Proposed Development and scope of the specialist chapters are addressed within Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration) and Chapter 28 (Carbon and Climate Change) of the ES Volume 1 (document reference 6.1.22, 6.1.23, 6.1.24 and 6.1.28).

27.4.1.5. Baseline data has been collected via a desktop study to identify the current consumption of material resources, generation of arising and generation and disposal of waste to landfill. The most up to date sources of available information have been used to collate data for material resource availability, landfill capacity and waste recovery. Indication of the most recent year from which data has been acquired has been provided throughout the Baseline (Section 27.5). Data to assess the availability of materials resources has been obtained and reviewed from the following sources:

- Monthly statistics of Building Materials and Components (Department for Business, Energy & Industrial Strategy, 2019);
- South East England Aggregates Monitoring report 2017 (South East England Aggregate Working Party, 2018);
- Profile of the UK Mineral Products Industry (Mineral Products Association, 2018);
- UK Steel Industry: Statistics and Policy (House of Commons Library, 2018);
- London Aggregates Monitoring Report 2017 (London Aggregates Working Party, 2017);
- The UK Plastics Industry at A Glance (British Plastics Federation, 2017);
- Approximate unwrought copper consumption volume in the United Kingdom (UK) from 2009 to 2014 (Statista, 2016);
- The Hampshire Minerals and Waste Local Plan Policies Map (Hampshire Authorities, 2013); and
- National and Regional Guidelines for Aggregates Provision in England 2005 – 2020 (Department for Communities and Local Government, 2009).

27.4.1.6. Data to assess the availability of waste management infrastructure and landfill capacity has been obtained and reviewed from the following sources:

- ENV23 - UK Statistics on Waste (Defra, 2019);
- Waste Management data for England (Environment Agency, 2018);
- Waste Data Interrogator 2017 (Environment Agency, 2018);
- Remaining Landfill Capacity (Environment Agency, 2018); and
- The Hampshire Minerals and Waste Local Plan Policies Map (Hampshire Authorities, 2013)

27.4.1.7. Forecasting remaining waste landfill capacity to the first year of operation (anticipated to be in 2024) has been undertaking using simple statistical forecasting (using the Microsoft Excel forecasting function).

27.4.1.8. The assessment takes into account the impacts and effects of the Proposed Development during construction, and the generation and disposal of waste for the first year of operation (anticipated in 2024). In addition, the impacts on material resources for a 40-year design life have been assessed in order to determine magnitude of effects, although it is acknowledged that operation is likely to continue beyond this period. The assessment methodology is the same for both construction and operational stages, and for clarity has been separated out into materials, arisings and landfill capacity below.

27.4.2. CONSTRUCTION STAGE

Materials

27.4.2.1. The assessment of the effects from materials has been undertaken by considering the origins and sources of materials, including their general availability (production, stock, sales) and the proportion of re-used or recycled materials they contain.

27.4.2.2. The assessment accounts for the relative volume of materials that needs to be consumed. In general, it is expected that the consumption of natural and non-renewable resources would result in adverse impacts.

27.4.2.3. As IAN 153/11 provides no stipulated thresholds for the sensitivity of, or magnitude of impact from, materials, the following approach has been developed and will be used as the basis for assessment:

- Magnitude: the underlying principle for assessing materials is that, typically, the larger and more complex a development footprint and associated groundworks, the greater the requirement to consume a greater volume and variety of products and goods. The magnitude of impact will be determined against the criteria set out in Table 27.2.
- Sensitivity: will be determined by evaluating the performance of materials that need to be consumed for the Proposed Development, against the criteria set out in Table 27.3.

27.4.2.4. The assessment accounts for the nature of impacts (adverse/beneficial, permanent/temporary, direct/indirect) from materials, and uses professional judgement to determine the significance of effect.

Arisings

27.4.2.5. Arisings (from Construction, Demolition and Excavation ('CDE') activities) have been evaluated to determine the volume of excavations that can be retained for re-use or recycling i.e. diverted from landfill. Understanding how the extent to which re-use and recycling will be adopted, will help reduce impacts from both materials consumption, and waste disposal.

27.4.2.6. The assessment takes into account the how site arisings will be managed, and uses professional judgement to determine how this would change or influence the significance effect for both materials and waste.

Landfill Capacity

27.4.2.7. An assessment of the remaining landfill capacity in South East England (including the London area) has been used to determine the impacts and effects of waste generated during construction and the first year of operation, for the Proposed Development.

27.4.2.8. The assessment has considered the volume and type of waste generated and the potential impacts and effects of each on remaining landfill capacity. The assessment has been completed for inert, non-hazardous and hazardous waste types. In general, it is expected that the generation of waste and its disposal to landfill, would result in adverse impacts.

27.4.2.9. As IAN 153/11 provides no stipulated thresholds for magnitude of impact of sensitivity from waste, the following approach has been developed and will be used as the basis for assessment:

- Magnitude: the underlying principle for waste is that, typically, the larger and more complex a development footprint and associated groundworks, the greater the likelihood that waste will be generated and disposed of to landfill. The magnitude of impact will be determined against the criteria set out in Table 27.2.
- Sensitivity: will be determined by evaluating forecast changes in landfill capacity against the criteria set out in Table 27.3.

27.4.2.10. The assessment takes account of the nature of impacts (adverse/beneficial, permanent/temporary, direct/indirect) from waste generated and disposed of, and uses professional judgement to determine the significance of effect.

27.4.3. OPERATIONAL STAGE

27.4.3.1. The Operational Stage assessment methodology is the same as the Construction Stage assessment methodology.

27.4.4. SIGNIFICANCE CRITERIA

27.4.4.1. In determining the significance of an effect, the magnitude of impact arising from the Proposed Development is assessed against the sensitivity of a particular environmental attribute or process under consideration. Whilst this approach varies from the descriptions included in Chapter 4 (EIA Methodology) of the ES Volume 1 (document reference 6.1.4), it is felt appropriate and proportionate, as it is based on guidance set out in IAN 153/11 Environmental Assessment of Material Resources (Highways England, 2011), supplemented with detail from industry best practice. The approach is now discussed.

Magnitude

27.4.4.2. Magnitude relates to the extent to which a receptor will be impacted, using the duration of the impact, timing, scale, size and frequency to determine impact. Magnitude of impact is evaluated in accordance with the definitions set out in Table 27.2 and will be assessed on a scale of major, moderate, minor, negligible and no change.

Table 27.2 - Definitions of 'magnitude' of impact

Magnitude of Impact	Materials*	Waste
Major	>50% of primary materials to be sourced internationally and/or Sterilises ≥1 mineral safeguarding site and/or peat resource	>1% reduction or alteration in **national** capacity of waste infrastructure, as a result of accommodating waste from a project
Moderate		>1% reduction or alteration in the **regional** (South East England) capacity of waste infrastructure as a result of accommodating waste from a project
Minor	>50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic scale)	
Negligible	Requires ≤50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic scale)	≤1% reduction or alteration in the **regional** (South East England) capacity of waste infrastructure
No change	No reduction or alteration in the availability of material assets at a regional scale in relation to the resources the project will use	No reduction or alteration in the capacity of waste infrastructure at a regional (South East England) scale
Notes	* for materials: magnitude of impact may be reduced wherever non-renewable/virgin/primary material consumption is reduced e.g. through use of recycled/secondary content, or materials with sustainable features (for example those that can be easily deconstructed or demounted, and re-used at end of first life)	

Value/Sensitivity

27.4.4.3. As described within Chapter 4 (EIA Methodology), sensitivity is a means to measure how affected receptors/processes and/or the receiving environment are expected to change. The sensitivity is assigned at the receptor/process level. Sensitivity is evaluated in accordance with the definitions set out in Table 27.3 and will be assessed on a scale of very high, high, medium, low and negligible.

Table 27.3 - Definitions of 'sensitivity'

Sensitivity	Materials	Waste
Very High	Are available only through national (and wider) supply Are known to be insufficient regarding supply and stock Comprise no reused or recycled content Offer no sustainable features and benefits compared to traditional materials	Reduce very significantly (between 90% and 100% reduction in regional (South East England) landfill capacity), require over 50% of project waste to be disposed outside of the region, or require new (permanent) waste infrastructure to be constructed to accommodate waste
High	Are generally not available through regional supply, and national (or wider) sourcing is substantially required Are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock Comprise little or no reused or recycled content Offer little or no sustainable features and benefits compared to traditional materials	Reduce significantly, between 50% and 90% reduction in regional (South East England) landfill capacity, and project waste requires disposal outside of the region
Medium	Are generally available through regional supply, though some national (or wider) sourcing may be required Are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock Incorporate some proportion of reused or recycled content	Reduce considerably, between 1% and 50% reduction in regional (South East England) landfill capacity

Sensitivity	Materials	Waste
	Offer some sustainable features and benefits compared to traditional materials	
Low	Are readily available through regional supply Are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock Comprise a high or industry-recognised good practice proportion of reused or recycled content Offer sustainable features and benefits compared to traditional materials	Reduce slightly, less than 1% reduction in regional (South East England) landfill capacity.
Negligible	Are readily available through regional supply Are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock Comprise a significant or industry-recognised best practice proportion of reused or recycled content Offer highly sustainable features and benefits compared to traditional materials	Remain relatively unchanged (less than 0.1% reduction in regional (South East England) landfill capacity), or an increase in regional (South East England) landfill capacity has been identified.

Significance

27.4.4.4. The significance level attributed to each effect has been determined by comparing the magnitude of impact due to the Proposed Development, with the sensitivity of the affected receptor. In order to assign a significance of effect category to assessed materials, arisings and waste, the information in Table 3.8.1 in DMRB LA104 Environmental assessment and monitoring (Highways England, 2019) (as replicated in Table 27.4) has been applied.

Table 27.4 – Matrix to assign significance of effect category

		Magnitude of Impact				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity	**Very High**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Note: where two significance criteria are provided, professional judgement shall be used to determine which criteria is most appropriate for use within the assessment.

27.4.4.5. The descriptions provided in Table 27.5 have been used to define the significance of effect from each element (materials, arisings, waste) assessed.

Table 27.5 - Definitions of 'sensitivity'

Effect category	Description of Effect	Significant
Very Large	Potential for extremely detrimental or beneficial effects in relation to construction materials, arisings or landfill capacity within the region.	Yes
Large	Potential for considerable detrimental or beneficial effects in relation to construction materials, arisings or landfill capacity within the region.	
Moderate	Potential for noticeable detrimental or beneficial effects in relation to construction materials, arisings or landfill capacity within the region.	
Slight	Potential for limited or barely perceptible detrimental or beneficial effects in relation to construction materials, arisings or landfill capacity within the region.	No

Effect category	Description of Effect	Significant
Neutral	No detrimental or beneficial effects in relation to construction materials, arisings or landfill capacity within the region.	

27.4.5. ASSUMPTIONS AND LIMITATIONS

27.4.5.1. The study area and baseline environment focuses on regional (South East England) and national (UK) geographical area, which is considered proportionate to the assessment of material resource availability and waste management infrastructure and capacity required for the Proposed Development. There is a potential for certain specialist materials to be sourced from outside of the UK (for example, materials associated with the fibreoptic and power cables, and rock for marine elements). At this time, a proportionate approach has been taken with regard to the potential sourcing of materials from outside of the UK: in summary, it is deemed proportionate that this element of the assessment will be covered by legal mandates and environmental evaluation processes appropriate to the non-UK country in which extraction, processing and export originates.

27.4.5.2. Baseline material data is derived from published sources detailing stocks, production, sales and consumption of mineral resources within the UK. Whilst it is understood that stocks, sales and consumption data may relate to materials sourced from outside the UK, it is considered that the published data give an appropriate indication of the availability of materials in the UK (and hence the 'draw' on supplies from further afield) and provide a 'best value proxy' for the baseline and assessment of sensitivity.

27.4.5.3. The assessment of waste and material resource is based upon the validity and maturity of the collated information, regarding the anticipated materials to be used and waste generated/disposed of.

27.4.5.4. Material and waste type and quantity data have been provided by the Design Team. The material and waste types and quantity data are based on the preliminary design of the Proposed Development and (in accordance with best practice and a robust legal approach) considers a 'worst case' scenario based on the upper limits of the design with regards to the consumption of material resources and generation of waste. As the Proposed Development progresses into detailed design, the estimated materials and waste types and quantities may alter, through the refinement of plans. Given that upper limits (worst case scenario) have been utilised for this assessment, such changes to the design are not anticipated to make impacts (and any related significance of effect) any worse than the outcomes of assessment.

27.4.5.5. Assumptions for the Converter Station have been made in relation to the depth of foundation construction materials (for example the pile mat, aggregate base course, precast concrete floor slab). Refer to Appendix 27.2 (Assumptions and Limitations) of the ES Volume 3 (document reference 6.3.27.2) for details of assumptions made. In addition, due to the preliminary design stage of the Converter Station, assumptions based on the structural design of other interconnection stations have been used, specifically for the quantities of concrete and steel.

27.4.5.6. At the time of writing, the cut and fill balance is based on the preliminary design, whilst taking into account a 'worst case scenario' approach. The cut and fill balance may fluctuate slightly as the suitability for re-use of cut material is assessed during the Construction Stage. Such changes are not currently considered to have the potential to materially affect the outcome of the assessment, and would not be expected to result in worsened impacts and effects given the use of the design upper limits.

27.4.5.7. In relation to the asphalt for the new road network within the Converter Station Area, it has been assumed that the road material laid during construction will be removed and replaced at the end of the project.

27.4.5.8. The type of material to be used for the elevation and wall cladding is currently unknown. As such, it is not possible to estimate the quantity (tonnage), however the volume (m^2) has been quantified.

27.4.5.9. Other wastes, such as contaminated materials and general construction wastes (plastic and packaging, for example) are unable to be quantified at this stage, however a qualitative assessment is not expected to materially affect the outcomes of this assessment.

27.4.5.10. Assumptions for the Onshore Cable Corridor have been made in relation to the length and number of cables, number of joint bays, duct and trench construction methods including pipe diameters and quantities of packaging waste. Assumptions have also been made on the density of materials to provide quantities in standard units (tonnes). Refer to Appendix 27.2 (Assumptions and Limitations) for details of assumptions made. In accordance with best practice and a robust legal approach, and where information on materials and waste is not readily available, a worst-case scenario based on the upper limits of the design has been adopted and used to inform the assessment. As such, any change in design could reasonably be anticipated to reduce (not worsen) impacts.

27.4.5.11. Potential wastes from the Onshore Cable Corridor, such as contaminated materials likely to be present within Milton Common, cannot be quantified at this stage as the volume waste to be generated will only be properly understood once the construction works commence. This is not expected to materially affect the outcomes of this assessment as the quantity of waste generated is considered, using professional judgement, to equate to less than a 1% reduction in regional (South East England) landfill capacity as detailed in Table 27.2.

27.4.5.12. Assumptions for the Marine Cable Corridor have been made in relation to the length of cable and number of cable joints required. Refer to Appendix 27.2 (Assumptions and Limitations) for details of assumptions made. The material used for non-burial protection, permanent and temporary fill is currently unconfirmed, but has been assumed to be rock (as opposed to concrete mattress or grout bags, for example) for the purposes for assessment, using a worst-case scenario approach. Assumptions have also been made to convert the estimated volume of materials required into standard units (tonnes). A 'worst case scenario' approach for the quantity of non-burial protection and fill, has been made based on the preliminary design.

27.4.5.13. The presence of sea floor debris (for example fishing nets, ropes, cables, anchors, chains) will be clarified during a detailed survey of the seabed which will be performed by the appointed contractor prior to the start of the construction phase. Whilst it is not possible to obtain estimated quantities of these potential wastes, their presence as a potential waste stream has been captured within this assessment.

27.4.5.14. Unless noted within Section 27.6, information on the recycled content of materials is not currently available at the time of writing. It is anticipated, however, that good and best practice will be used to maximise use of recycled materials and maximise waste recovery and diversion from landfill, as set out in the Outline Onshore CEMP and Outline Marine CEMP (document reference 6.5).

27.4.5.15. Baseline data and information for the assessment are (unless otherwise stated) only available to 2017.

27.4.5.16. Material resource availability data for copper consumption and plastic materials and steel production for the South-East region is currently unavailable. National data are, however, available and the absence of regional data is not anticipated to materially affect the assessment.

27.4.5.17. No regional data for CDE production or recovery rates are currently available for the South-East region. Data for non-civic material transfer, recovery and metal recycling are used instead (see Section 27.5.3). The absence of CDE recovery rates for the region is not considered to affect the overall findings of the assessment.

27.4.5.18. UK landfill operators can claim commercial confidentiality for their data at time of submission; data for sites with a commercial confidentiality in place are therefore unavailable for the analyses presented in this assessment. This is not, however, considered to affect the overall conclusions of the assessment.

27.4.5.19. The Department for Environment, Food and Rural Affairs (Defra) has been previously consulted to determine whether generation and recovery rates for CDE arisings were available by region. Defra confirmed that it does not publish CDE figures at a regional level, and only national (England) data are accessible through the publicly available Waste Data Interrogator Database; the database is held and operated by the Environment Agency. It was quoted that: "*The methodology used to generate these figures is complex, in order to take into account, the inherent double-counting and*

data gaps that are present within waste system data, and it would not be feasible to reproduce these on a regional basis". Until such a time that CDE generation and recovery rates by region are available, transfer (non-civic), recovery and metal recycling data (available through the Waste Data Interrogator Database) has been used as the closest possible proxy.

27.4.5.20. It is acknowledged that future changes to markets, could have an impact on supply chain security. Whilst these changes and associated effects cannot currently be forecast, ongoing assessment of impacts on the Proposed Development should be made and reported, by the Project Sponsor or its representative. In keeping with a proportionate assessment, no further evaluation of potential changes to the market, and their influence on materials and waste management, are made in this chapter.

27.5. BASELINE ENVIRONMENT

27.5.1.1. This section describes the baseline for material consumption and waste generation and disposal for the current land uses (agricultural land, highways and car parks, and seafloor). It also provides regional and national information and data in the context of which the environmental impact assessment will be undertaken. Consequently, the baseline assessment includes Section 1 - Lovedean (Converter Station Area); Sections 2 – 10 the Onshore Cable Corridor; and the Marine Cable Corridor.

27.5.2. MATERIALS

Material requirements for the current land use

27.5.2.1. The operation and maintenance of the existing highway and car park land uses (without the Proposed Development) are anticipated to be limited to works typically required for maintenance and operation activities. Materials are likely to include specialist components (e.g. light bulbs, signage steelwork, replacement barriers) as well as some bulk material (asphalt for minor re-surfacing) for routine works and repairs of the highway and ancillary infrastructure. No significant consumption of construction material resources is considered likely for agricultural land use or the seafloor.

27.5.2.2. The current consumption of construction material resources on the land which the Proposed Development is proposed to be located is therefore deemed minimal as resources required for day to day maintenance and operation would be very limited in scale.

Availability of construction materials in South East England and UK

27.5.2.3. Table 27.6 provides a summary of the availability of the main construction materials in South East England (Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, London, Oxfordshire, Surrey and West Sussex) and the UK, as required to deliver a typical cabling project. Although materials sourcing may be required outside of the UK, the overview is considered suitable to provide the context in which the assessment of impacts and significant effects from material consumption from the Proposed Development has been undertaken. Where material sourcing may be required from outside the UK for specialist components (as reflected in Table 27.11, Table 27.12 and Table 27.13) this is reflected in the assessment of sensitivity and magnitude of impact.

Table 27.6 – Construction materials availability in South East England and the UK

Material Type	South East	UK
Asphalt *	4.3 million tonnes (Mt)	27.3 Mt
Concrete blocks #	1.2 million square meters (m2) (Southern region) (2018)	6.2 Mm2 (2018)
Copper ^	(no data)	22,800 t (2014)
Permitted crushed rock *	0.1 Mt	144.5 Mt
Plastic materials +	(no data)	1.8 Mt
Primary aggregate *	30.2 Mt (2016 South East and 2014 London)	203 Mt
Ready-mix concrete *	6.1 Million cubic meters (Mm3)	25.9 Mm3
Recycled and secondary aggregate *	4.0 Mt (2016, no data coverage for London)	74 Mt
Sand and gravel (marine dredged)*	9.6 Mt (2018)	11.6 Mt (2018)
Steel +	(no data)	8 Mt (2016)

 # stocks + production * sales ^ consumption
Data availability: 2017 unless otherwise stated
Data sources: (Department for Business, Energy & Industrial Strategy, 2019); (South East England Aggregate Working Party, 2018); (Mineral Products Association, 2018); (House of Commons Library, 2018); (London Aggregates Working Party, 2017); (British Plastics Federation, 2017); (Statista, 2016).

27.5.2.4. The Hampshire Minerals and Waste Local Plan Policies Map (Hampshire Authorities, 2013) indicates that the Proposed Development passes through clay mineral safeguarding areas in the region of Denmead and Great Salterns Recreation Ground. Given the proximity of the existing urban development to these safeguarded areas, the proposed Cable Corridor is not considered to adversely impact upon or further sterilise these protected sites. The impact of mineral resource continuation and sterilisation to this safeguarding area is presented in Chapter 18 (Ground Conditions) of the ES Volume 1 (document reference 6.1.18).

27.5.2.5. The South-East region has an average recycled content target for aggregate of 26%, which is very slightly above the average for England (25%) (Department for Communities and Local Government, 2009).

27.5.2.6. Where data is available, the South-East region has, in general a higher than average availability of construction materials in comparison to other UK regions. Sales and stocks of permitted crushed rock and concrete blocks are below the UK average, however national supplies are buoyant.

27.5.2.7. Using UK data as a proxy, in combination with information that is available for the South East, the availability of construction materials across the UK which is typically required for cabling projects, indicates that stocks/production/sales remain sufficient to accommodate the Proposed Development. The sensitivity of materials availability for the Proposed Development is assessed to be **high**.

27.5.3. SITE ARISINGS

Site arisings generated for the current land use

27.5.3.1. Current agricultural activities on the land where the footprint of the Converter Station and ancillary development is proposed to be located are considered to have the potential to generate site arisings (such as earthworks, woodchip or rubble from demolished buildings). The highway, car park and seafloor land uses are considered to generate minimal arisings associated with minor repair works.

27.5.3.2. The regional context for an environmental assessment of arisings is provided below.

Transfer, treatment and metal recycling in South East England and England

27.5.3.3. Defra data (Defra, 2019) (Table 27.7) shows that within England, the recovery rate for non-hazardous construction and demolition wastes has remained above 90% since 2010. This exceeds the EU target of 70%, which the UK must meet by 2020.

Table 27.7 – Non-hazardous construction and demolition arisings recovery in England

Year	Generation (Mt)	Recovery (Mt)	Recovery Rate (%)
2010	53.6	49.4	92.2%
2011	54.9	50.8	92.5%
2012	50.5	46.4	92.0%
2013	51.7	47.6	92.0%
2014	55.9	51.7	92.4%
2015	57.7	53.3	92.3%
2016	59.6	55.0	92.1%

27.5.3.4. No regional data for construction, demolition and excavation production or recovery rates are currently available for South East England. As such, data (Environment Agency, 2018) in Plate 27.2 are provided for all waste types in South East England and hence will include, but are not specific to, construction, demolition and excavation wastes. Data show that rates of material recovery in the region have - generally - risen steadily over the past 18 years. Transfer and metal recycling rates have, despite annual fluctuations, maintained a slightly increasing trendline, with a clear increasing trend observed in material recovery.

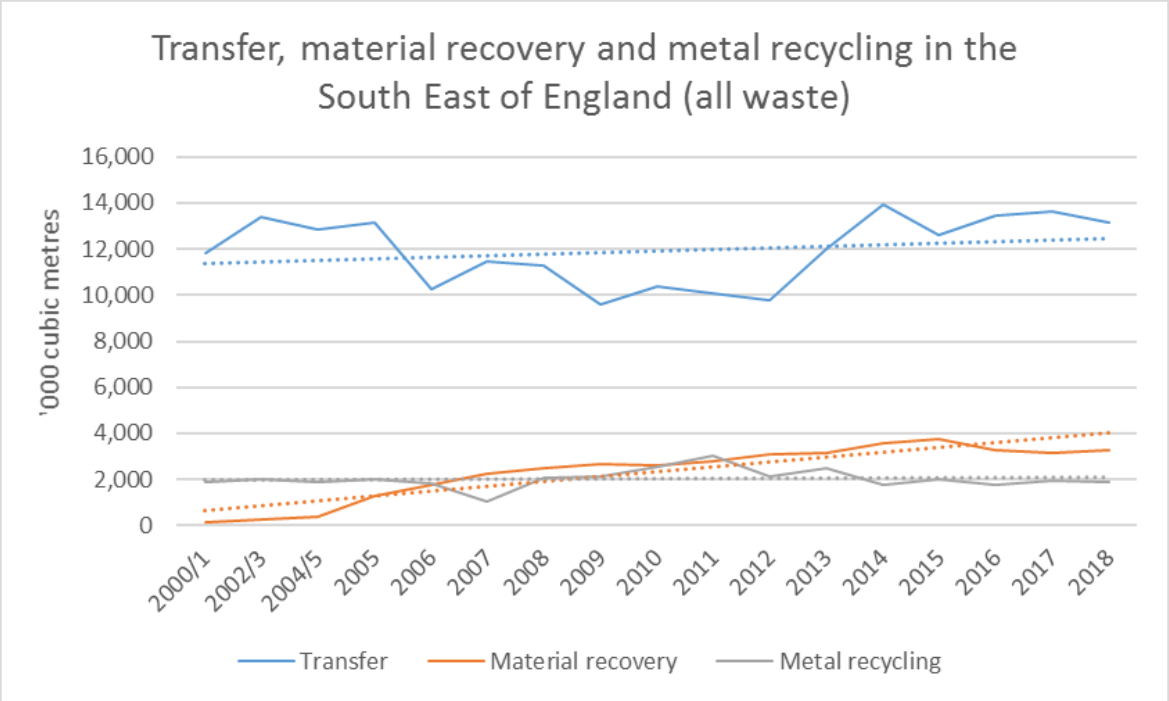

Plate 27.2 – Transfer, materials recovery and metal recycling in South East England (2000/1 – 2018)

27.5.3.5. Whilst trends for transfer, recovery and metal recycling in South East England display different characteristics, data indicate that regional infrastructure and capacity is sufficient for the transfer and recovery of construction, demolition and excavation wastes from the Proposed Development. Recovery trends across England (Plate 27.2) and data in Table 27.8 confirms this assertion (Environment Agency, 2018).

Table 27.8 – Permitted waste recovery management sites in South East England (2018)

Waste recovery facility type	Number of sites	Throughput (Thousand tonnes)
Incineration	37	4,478
Transfer	539	14,891
Treatment	559	18,556
Metal recovery	275	2,450
Use of waste	1	0
Total	1,465	40,375

27.5.3.6. The availability of materials recovery infrastructure in South East England, and across England, suggests that there is strong potential to divert from landfill sites, arisings generated by the Proposed Development.

27.5.4. WASTE

Waste generated and disposed of for the current land use

27.5.4.1. It is anticipated that wastes currently generated and disposed of within the current land use (without the Proposed Development) are minimal. The highway and car park elements are likely to generate small volumes of waste from routine maintenance and minor repairs. Wastes may include littering, light and signage replacement, replacement of reflective road studs (cats' eyes), vegetation from verge clearance and minor barrier refurbishments. No significant quantities of wastes are anticipated to be generated in relation to agricultural land or the seafloor.

27.5.4.2. The current generation of waste is therefore deemed to have a minimal impact in the context of available regional landfill capacity.

Remaining landfill capacity in South East England

27.5.4.3. Environment Agency data (Environment Agency, 2018) confirmed at the end of 2018, 62 landfill sites in South East England were recorded as having 80.2 million cubic meters (Mm^3) of remaining capacity. Data in Table 27.9 summarises this information by landfill type and shows the change in capacity from 2017 to 2018.

Table 27.9 – Non-hazardous construction and demolition arisings recovery in South East England

Landfill type	Remaining capacity in 2017 (m^3)	Remaining capacity in 2018 (m^3)	2017-2018 capacity comparison (m^3)
Hazardous (merchant and restricted)	219,000	228,000	+9,000
Inert	29,465,000	30,286,000	+821,000
Non-hazardous (including stable hazardous waste cells)	50,695,000	49,662,000	-1,033,000
Total	80,379,000	80,176,000	- 203,000

27.5.4.4. The 2013 Hampshire Minerals and Waste Plan (Hampshire Authorities, 2013) estimates that an additional 1.8 Mm^3 of non-hazardous landfill capacity would be required until 2030, although no specific proposal for the development of additional and fill capacity is stated within the Plan.

27.5.4.5. Baseline regional capacity is detailed in Plate 27.3. Simple statistical forecasting (using the Microsoft Excel forecasting function) has been used to demonstrate long term void capacity to the first year of operation (anticipated in 2024) in the absence of future provision.

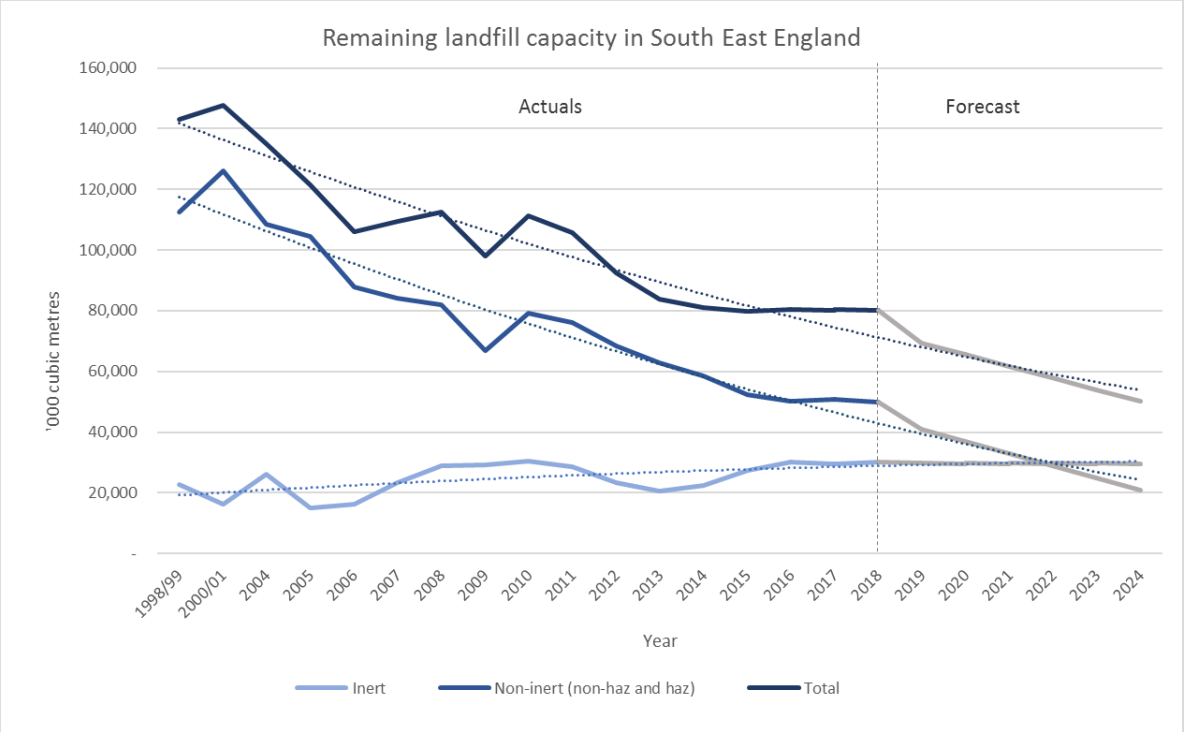

Plate 27.3 – Remaining landfill capacity in South East England

27.5.4.6. Baseline data indicate that total landfill capacity and non-inert landfill capacity is likely to become an increasingly sensitive receptor over the life of the proposed development to the first year of operation. Inert landfill capacity has been relatively constant, however a slight decrease in capacity is shown in the forecast data. Plate 27.3 shows that waste capacity in South East England is forecast to reduce by as much as 22% (inert landfill capacity), 58% (non-inert landfill capacity), and 37% (total landfill capacity) by 2024, in the absence of future provision.

27.5.4.7. Due to the forecast percentage reduction in landfill capacity and using the criteria set out in Table 27.3, the sensitivity of different landfill capacity types during the Construction Stage and to the first year of operation is assessed to be **medium** (for inert waste landfill capacity), **high** (for non-inert waste landfill capacity).

27.5.5. FUTURE BASELINE

Materials

27.5.5.1. In the future baseline it is anticipated that there will be no change to material use within the Order Limits. However, materials will continue to be required for other construction projects in the South East. Given that South East England generally has a higher availability of construction materials in relation to other regions in England and the Local Policies in place in the Hampshire Minerals and Waste Plan (Hampshire Authorities, 2013), it is anticipated that stocks/production/sales will remain buoyant in the future baseline.

Waste

27.5.5.2. In the future baseline it is anticipated that there will be no change to waste generation within the Order Limits. In the future, baseline landfill capacity in the South East will continue to decline in the absence of future provision. However, the volume of waste generated in the future baseline is expected to remain minimal in the context of available regional capacity.

27.6. PREDICTED IMPACTS

27.6.1.1. The Proposed Development has the potential to consume material resources (including those recovered from site arisings), and produce and dispose of waste during the demolition, site preparation, and construction stages of the Converter Station, the Onshore and Marine Cable Corridor elements.

27.6.1.2. The associated potential environmental impacts (both direct and indirect) will occur principally during construction, and during operation. Potential impacts during decommissioning have been scoped out of this chapter (see Table 27.1).

27.6.1.3. The impacts during construction and operation (for material resource consumption and only during the first year of operation for waste generation) will be associated with the production, processing, consumption and disposal of material resources.

27.6.1.4. The impacts of the Proposed Development on material resources (including recovered site arisings) and waste generation and disposal, are likely to occur on-site, off-site within the UK and, potentially, internationally.

27.6.1.5. Table 27.10 summarises the impacts associated with materials consumption, and waste generation and disposal.

Table 27.10 – Environmental impacts associated with materials and waste

Element	Direct impacts	Indirect impacts
Materials	Consumption of natural and non-renewable resources	Release of greenhouse gas emissions Water consumption and scarcity Nuisance to communities (visual, noise, vibration) Health
Waste	Generation and disposal of waste	Release of greenhouse gas emissions Nuisance to communities (visual, noise, vibration) Health
Note: only the direct impacts are assessed within this chapter. Indirect impacts relevant to the Proposed Development and scope of the specialist chapters are addressed within Chapter 22 (Traffic and Transport), Chapter 23 (Air Quality), Chapter 24 (Noise and Vibration) and Chapter 28 (Carbon and Climate Change)		

27.6.2. CONSTRUCTION STAGE

Embedded Mitigation

27.6.2.1. Embedded mitigation in relation to material resource consumption and waste generation and disposal during Construction Stage comprises:

- The design of the Converter Station will seek to balance cut and fill of excavated earthworks in order to minimise the quantity of imported earthwork material and to maximise re-use of arisings. Based on the preliminary design, there is a surplus of 45,325 tonnes of material generated.
- As detailed in Chapter 3 (Description of the Proposed Development), marine cables will be routed (where practicable) to avoid mobile bedforms and minimise the requirement for clearance. Where this is not possible, clearance will be either by Mass Flow Excavation ('MFE') (which temporarily displaces material), or by dredging and deposit of material onto the sea bed. Either option will preclude the generation of waste arisings and negate disposal to landfill.

Impacts

27.6.2.2. At the preliminary design stage, a detailed bill of quantities and anticipated quantities of waste generation has not been prepared. As such, estimates of material and waste types and quantities have been prepared by the design team based on their professional judgement.

27.6.2.3. Table 27.11 to Table 27.19 present the quantities and likely source of materials required for the construction of the Proposed Development, and the quantities of, and expected recovery or disposal routes for, arisings and waste generated during construction.

27.6.2.4. In response to the requirements set out in Section 3.2.1 of IAN 153/11 (Highways England, 2011) a summary of the potential impacts from material resource consumption, and waste generation and disposal, are reported in Table 27.20. In line with IAN 153/11, the detailed reporting matrix includes an assessment of magnitude. The magnitude of impact assessment incorporates the embedded construction mitigation measures listed in Paragraph 27.6.2.

Materials required for construction

27.6.2.5. The materials set out in Table 27.11, Table 27.12 and Table 17.13 are those likely to be consumed during the Construction Stage of the Proposed Development for the Converter Station, the Onshore Cable Corridor and Marine Cable Corridor. The information has been gathered from data provided by the Design Team. At the current stage of design, it should be noted that all quantities are approximate. Data use of primary, secondary materials and recycled content of materials is not available at the current (preliminary) design stage of the Proposed Development.

Table 27.11 - Materials imported to site during the Construction Stage: Converter Station

Materials	Quantity (tonnes)	Comments
Aggregate	120,050	National sourcing Required for pile mat, chippings, road construction, surfacing, laydown and car park areas and Telecommunications Buildings Aggregate for the pile mat (60,000 tonnes) will be Type 6F5, a recycled aggregate made up of crushed hardcore
Asphalt	10,000	Regional/national sourcing Required for road network and access tracks within the Converter Station compound
Blockwork	43	Local/national sourcing Required for Telecommunications Buildings
Brickwork	35	Local/national sourcing Required for Telecommunications Buildings

Materials	Quantity (tonnes)	Comments
Concrete	58,059	Local/regional sourcing Required for foundations, transformer bunds, internal roads and ramps, flooring, fire walls and the Telecommunications Buildings.
Elevation and wall (cladding)	Unknown	Likely to be sourced nationally The type and quantity of material is under design development and cannot be quantified at this stage. Estimates indicate 50,100m^2 of cladding will be required.
Plastic (geogrid)	650	National sourcing Geogrid is made from recycled plastic.
Precast concrete	14,985	National sourcing Precast concrete required for the first floor of the control building, kerbs, precast piles and troughs.
Steel	4,660	National sourcing Steel required for building construction, support for external and internal electrical equipment and reinforcement
Total	208,482	Based on current design information it is expected that these materials could be sourced nationally or regionally.

Table 27.12 - Materials imported to site during the Construction Stage: Onshore Cable Corridor

Materials	Quantity (tonnes)	Comments
Aggregate	23,055	Regional/national sourcing Required for road re-instatement and ORS infrastructure
Asphalt	5,300	Regional/national sourcing Required for road re-instatement
Blockwork	64	Local/national sourcing Required for ORS infrastructure

Materials	Quantity (tonnes)	Comments
Brickwork	53	Local/national sourcing Required for ORS infrastructure
Cable (fibre optic)	10	International sourcing Cable will comprise glass and polymers
Cable (power)	1,865	International sourcing Cable will comprise in the region of 1,350 tonnes copper and 91 tonnes aluminium
Cement bound sand	14,850	Regional sourcing Required for cable duct surround
Concrete	1,959	Regional/national sourcing Required for cable duct surround where cement bound sand is not suitable, and for ORS infrastructure.
Drilling fluid (Bentonite)	806	National sourcing Required for drilling fluid.
Drilling fluid (Xanthan Gum)	90	National sourcing Required for drilling fluid.
Grout	470	Regional/national sourcing
Plastic (HDPE)	750	International/national sourcing Required in cable ducts for HDD cables
Plastic (U-PVC)	420	National sourcing Required in trenched cable ducts
Rubber	4,300	National sourcing Comprises cable covers Made from recycled types
Steel	90	National/international sourcing

Materials	Quantity (tonnes)	Comments
		Steel pipes for railway crossing and mesh for ducting
Total	54,082	Based on current design information it is expected that the majority of these materials could be sourced nationally or regionally, however some international sourcing of specialist materials is anticipated

Table 27.13 - Materials imported to site during the Construction Stage: Marine Cable Corridor

Materials	Quantity (tonnes)	Comments
Cable (fibre optic)	1,050	International sourcing
Cable (power)	21,860	International sourcing
Cable Joints	12	International sourcing
Concrete	10	Regional/national sourcing Clump weights for cable may be a re-useable item (rather than having to be made specifically). Sourcing will be managed by the construction contractor, once commissioned.
Rock	851,400	European sourcing Rock material breakdown: • 725,000t of remedial non-burial protection. This may utilise concrete mattresses, grout bags or rock bags; the exact form of this material will be determined by the construction contractor, once commissioned. • 112,000t cable crossing – post-lay bund. • 9,500t cable crossing – pre-lay bund. This may utilise concrete mattresses, but the exact form of this material will be determined by the construction contractor, once commissioned. • 4,900t HDD exit pit permanent fill.

Rock bags	4,900	European sourcing Used for HDD Exit Pit temporary fill.
Total	879,244	Based on current design information it is expected that the majority of these materials will be sourced internationally.

Arisings generated and diverted from landfill during construction

27.6.2.6. Forecasts for waste recovery (diverted from landfill) from the Proposed Development during construction are presented in Table 27.14, Table 27.15 and Table 27.16 for the Converter Station, the Onshore Cable Corridor and Marine Cable Corridor. The information has been gathered from data provided by the Design Team. At the current stage of design, it should be noted that all quantities are approximate.

27.6.2.7. The preliminary design indicates that the Converter Station will comprise the greatest cut and fill volumes, with the cut generating 199,905 tonnes of excavated material. Estimates suggest that 154,580 tonnes of material can be re-used on site for platform fill, reprofiling of the landscape and pond fill, leaving a surplus of approximately 45,325 tonnes, which is likely to be utilised for off-site general or landscape fill.

Table 27.14 - Forecast site arisings that can be recovered and hence diverted from landfill: Converter Station

Excavated and other materials	Quantity (tonnes)	Comments
Aggregate	10,000	Off-site recycling Generated from partial removal of piling matt and removal of temporary laydown areas to allow re-instatement of land to agricultural use A small fraction of aggregate may need to be disposed of to landfill if contaminated, however the quantity cannot be calculated at this stage.
Bituminous materials	1,700	Likely to be recovered providing no coal tar is present. 40mm wearing course from road network within the Converter Station compound to be removed.
Concrete	2,200	Off-site recycling Generated through removal of temporary accommodation foundations and cropping of precast piles
Earthworks	199,905	On-site and off-site re-use Generated through on-site excavations (cut) associated with the Converter Station and Telecommunications

Excavated and other materials	Quantity (tonnes)	Comments
		Buildings. It is anticipated that 154,580 tonnes of materials can be re-used on-site, with 45,325 tonnes of surplus material requiring off-site recovery (potentially as general or landscaping fill).
Total	213,805	Based on current design information it is expected that the majority of Converter Station wastes and arisings could be recovered and therefore diverted from landfill.

Table 27.15 - Forecast site arisings that can be recovered and hence diverted from landfill: Onshore Cable Corridor

Excavated and other materials	Quantity (tonnes)	Comments
Aggregate	34,000	Off-site recycling Generated from trenching excavation
Bituminous materials	5,300	Off-site recycling Generated from trenching excavation May be classified hazardous waste depending on coal tar content
Concrete	200	Off-site recycling Generated from excavation of footpaths
Top soil/earthworks	31,000	Off-site recycling Generated from trenching excavation
Top soil/earthworks	1,196	On-site recovery through backfilling Generated from pit excavation for HDD and during ORS infrastructure construction.
Total	71,916	Based on current design information it is expected that the majority of Onshore Cable Corridor wastes and arisings could be recovered and therefore diverted from landfill.

Table 27.16 - Forecast site arisings that can be recovered and hence diverted from landfill: Marine Cable Corridor

Excavated and other materials	Quantity (tonnes)	Comments
Arisings and drilling fluid from HDD	48	Dispersed to sea Generated through HDD drilling
Boulders	1,200	Moved to side of the Marine Cable Route, but within the Marine Cable Corridor Generated through clearing for the Marine Cable Route
Sand and gravel	2,980,000	Moved to side of Marine Cable Route, but within the Marine Cable Corridor. Generated through removal of sandwaves during clearing of Marine Cable Route
Sand, gravels, clays	1,175,000	Moved to side of the Marine Cable Route, within the Marine Cable Corridor and possibly re-used for infilling marine trenches Generated through trenching.
Total	4,156,248	Based on current design information it is expected that the majority of Marine Cable Corridor wastes and arisings could be recovered and therefore diverted from landfill.

Waste generated and disposed of to landfill during construction

27.6.2.8. Table 27.17, Table 27.18 and Table 27.19 provides a summary of wastes anticipated to be disposed of to landfill during the Construction Stage for the Converter Station, the Onshore Cable Corridor and Marine Cable Corridor, as identified by the Design Team. At the current stage of design, it should be noted that all quantities are approximate.

Table 27.17 - Forecast site arisings that have been identified for disposal to landfill: Converter Station

Excavated and other materials	Quantity (tonnes)	Comments
Contaminated materials	Not quantifiable at this time	Landfill (as worst-case scenario), but may be able to re-use onsite or send for off-site treatment Generated from historical infill of former mineral extraction sites Likely to be classified as hazardous waste
General construction waste (for example packaging and plastics)	Unknown	Landfill (as worst-case scenario) Generated through surplus bulk construction materials and packaging wastes
Total	Unknown	Unable to quantify anticipated waste to landfill as quantities will only be generated once construction works commences.

Table 27.18 - Forecast site arisings that have been identified for disposal to landfill: Onshore Cable Corridor

Excavated and other materials	Quantity (tonnes)	Comments
Arisings and drilling fluid from HDD	23,830	Landfill Non-hazardous waste.
Contaminated materials	2,000	Landfill (as worst-case scenario), but may be able to re-use onsite or send for off-site treatment Generated through trenching of former landfill Likely to be classified as hazardous waste
Metals*	170	Landfill Generated from spent cable drums
Plastic packaging*	2	Landfill Plastic protection and packaging of cable drums.

Excavated and other materials	Quantity (tonnes)	Comments
Total	26,002	Based on current design information it is expected that some wastes and arisings from the Onshore Cable Corridor construction will be disposed of to landfill.
**** Notes: Items such as spent cable drums and plastic packaging wastes are considered to be re-useable or recyclable, however this will be dependent on the Contractor's policies and procedures. A worst-case scenario assumption has been made for this assessment, which assumes that the items will be disposed of to landfill.***		

Table 27.19 - Forecast site arisings that have been identified for disposal to landfill: Marine Cable Corridor

Excavated and other materials	Quantity (tonnes)	Comments
Debris	Unknown	Landfill Debris may include discarded fishing nets, ropes, cables, anchors, chain,
Out of service cables	10	Landfill Anticipated to not be cost effective to remove metals from armoured cables for recovery.
Total	10	Based on current design information it is expected that some wastes and arisings from the Marine Cable Corridor construction will be disposed of to landfill. Unable to quantify all anticipated waste to landfill as quantities will only be known once construction works commences.

27.6.2.9. Table 27.20 provides an overview of the potential impacts of consuming material resources and disposing of waste during key construction stages of the Proposed Development. Data used to provide this overview is based on information provided in Table 27.11 to Table 27.19 and the sensitivity of resource availability and landfill capacity as identified in the Baseline (Section 27.6). In response to the requirements set out in Section 3.2.1 of IAN 153/11 (Highways England, 2011), the magnitude impact is provided.

Table 27.20 - Potential impacts of consuming material resources and disposing of waste during construction of the Proposed Development

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
Demolition	**Material consumption** It is currently anticipated that no demolition of existing structures is required on the agricultural land, existing highways and car parks associated with the proposed Converter Station, Onshore Cable Corridor, or within the Marine Cable Corridor. Therefore, no adverse impacts are anticipated associated with material consumption.	No adverse impacts anticipated. The magnitude of impact is anticipated to be no change. As no demolition is required, no further assessment of this lifecycle stage has been made within this chapter.
	Waste generation and disposal It is currently anticipated that no demolition of existing structures is required on the agricultural land, existing highways and car parks associated with the proposed Converter Station, Onshore Cable Corridor, or within the Marine Cable Corridor. Therefore, no adverse impacts are anticipated associated with waste generation and disposal.	On the basis that no demolition is required, no potential adverse impacts are therefore identified. The magnitude of impact is anticipated to be no change. As no demolition is required, no further assessment of this lifecycle stage has been made within this chapter.
Site remediation/ preparation	**Material consumption** **Converter Station** Material resources required for site remediation/preparation at the Converter Station are anticipated to be comprise installation of perimeter fencing, granular material (aggregate) for temporary laydown areas. Anticipated quantities of these elements (where provided by the Design Team) are detailed in Table 27.11 and estimated to be in the region of 60,000 tonnes.	During site remediation/preparation any impacts associated with material resource consumption are considered to be limited in scale, but would be adverse, permanent and direct. Based on the preliminary design information and using professional judgement, the magnitude of impact (as

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
	Onshore Cable Corridor No material resources are anticipated for the preparation of the Onshore Cable Corridor aspects. **Marine Cable Corridor** No material resources are anticipated for the preparation of the Marine Cable Corridor aspects.	per the criteria set out in Table 27.2) is anticipated to be negligible as over 50% of the material are likely to be sourced nationally or at a lower geographic scale.
	<u>Waste generation and disposal</u> **Converter station** The Converter Station design estimates that the cut will be 199,905 tonnes. It is anticipated that 154,580 tonnes of material can be re-used on site for platform fill, reprofiling of the land scape and pond fill, leaving a surplus of approximately 45,325 tonnes. It is anticipated that the surplus material will be suitable for off-site general or landscaping fill and therefore diverted from landfill. Although no exceedances of the generic assessment criteria for soils and groundwater were identified (as discussed further in Chapter 18 (Ground Conditions)) there is potential to uncover ground with elevated concentrations of contaminants to be identified during site remediation / preparation works from historical infilling of former mineral extraction sites at the Converter Station. Whilst the quantity of potential contaminated materials is currently not known, it is considered likely hazardous materials are present. Disposal methods may be able to divert the material from landfill through the application of the CL: AIRE Definition of Waste: Code of Practice (Environment Agency, n.d.) by implementing a MMP, or through off-site treatment/recovery to avoid landfilling of arisings. Disposal	Where any site arisings cannot be diverted from landfill, the impacts associated with disposal of waste would be adverse, permanent and direct. CDE arisings which can be re-used either on or off site will reduce the impact of waste disposal to landfill. The impact of contaminated materials is assessed further in Chapter 18 (Ground Conditions). Based on the preliminary design information and using professional judgement, the magnitude of impact is anticipated to be negligible as the Proposed Development is anticipated to generate a less than 1% reduction in the current regional capacity of waste infrastructure.

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
	methods however cannot be confirmed until the material is assessed further. Quantities and types of waste generated for diversion from landfill and disposal to landfill are presented in Table 27.14 and Table 27.17. **Onshore Cable Corridor** Site arisings anticipated during site remediation/preparation would be generated through cut and fill associated with the ORS infrastructure and cable corridor, which is anticipated to achieve reuse amounting to 1,1960 tonnes of excavated material through on-site levelling and backfilling of HDD excavated pits. Other arising will be generated where potential contaminated materials are encountered along the cable corridor. Particular areas of concern are where the cable corridor passes through former landfills, at sites include Sports Field Kendal's Quarry (Section 7), and the following areas in Section 8: Sports Field East of Eastern Road Landfill, Great Saltern Quarry Landfill, Land South of Burfields Road Landfill, and Milton Common Landfill. There is also the potential for explosive residues and radioactive contamination at the Landfill area (Section 10) due to former Ministry of Defence activities within this area. Disposal methods may be able to divert the material from landfill through the application of the CL:AIRE Definition of Waste: Code of Practice (Environment Agency, n.d.) by implementing a MMP, or through off-site treatment/recovery to avoid landfilling of arisings. Disposal methods however cannot be confirmed until the material is assessed further. The quantity of potentially contaminated arisings which may require disposal to licenced landfill or specialist treatment facility cannot be determined at this stage.	

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
	Quantities of waste arisings (for diversion from landfill) and waste expected to be landfilled are provided in Table 27.15 and Table 27.18. **Marine Cable Corridor** Preparation for the marine environment will require the clearing of sand wave material, boulders, debris, out of service cables and any potential unexploded ordnance. These elements are detailed further in Table 27.16 and Table 27.19. It is expected that sand wave material and boulders will be moved within the Marine Cable Corridor, mitigating the need for any material to be brought onshore. Debris, such as fishing nets, rope, out of service cables will most likely require disposal to landfill.	
Construction	**Material consumption** **Converter Station** Anticipated bulk construction material types comprise aggregate (roadway and surfacing), asphalt (roadways), brick and blockwork (Telecommunications Buildings), concrete (foundations, flooring, roads and ramps, bunds and firewalls), elevation and wall cladding, plastic geogrid, precast concrete (flooring, kerbs, piles and trenches) and steel (support and reinforcement). Other ancillary materials such as drainage, steel fencing, windows, plasterboard and insulation will also be required. Estimated quantities of the material types (as provided by the Design Team) are detailed in Table 27.11 and estimated to be in the region of 148,482 tonnes. **Onshore Cable Corridor** The construction of the Onshore Cable Route will comprise a combination on trench excavation and HDD to allow cables to be installed. These processes are estimated to	The Construction Stage is anticipated to see the greatest use of primary and secondary materials (natural and non-renewable). Any impacts associated with material resource consumption would be adverse, permanent and direct. The re-use of CDE arisings (from on or off-site sources) will reduce the adverse impact of materials resource consumption. The Onshore Cable Corridor passes through two mineral safeguard areas, however, given the proximity of the existing urban development to these safeguard areas, the

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
	require in the region of 54,802 tonnes of imported material comprising aggregate, asphalt, bentonite, cables (fibre optic and metal), cement bound sand, concrete, grout, plastic, rubber, steel and xanthan gum. The ORS infrastructure will require brick and blockwork, concrete and aggregate. A breakdown of the material types, quantities and likely source is provided in Table 27.12. Information on the recycled content of materials for the ORS infrastructure and Onshore Cable Corridor is not known at this stage of the design, however the rubber cable covers are known to be made from recycled tyres. Due to the specialist nature of the cables, plastic ducting and availability of steel, international sourcing is anticipated for these items. **Marine Cable Corridor** The Marine Construction Stage will require imported materials including rock (or concrete mattress, grout bags, rock bags or similar) for non-burial protection, temporary and permanent fill and cable crossing bund; power cables and FOC, and concrete weights. Provisional estimates indicate that 851,400 tonnes of imported rock material, plus 4,900 tonnes of rock bags (both sourced from Europe) will be required. Due to the specialist nature of the cables (power and fibre optic) and rock material, the rock material may be sourced from the European mainland. Estimated quantities of imported materials are presented in Table 27.13.	proposed cable corridor is not considered to sterilise the mineral safeguard site. The potential impact on mineral safeguard sites is assessed further in Chapter 18 (Ground Conditions). Based on the preliminary design information and using professional judgement, the magnitude of impact is anticipated to be moderate as over 50% of the primary materials will be sourced internationally and no mineral safeguarding areas will be fully sterilised.
	<u>Waste generation and disposal</u> **Converter Station** Arisings generated through the construction of the Converter Station and Telecommunications Buildings are anticipated to comprise aggregate (from removal of the surface of the pile mat and	Where any site arisings cannot be diverted from landfill, the impacts associated with disposal of waste would be adverse, permanent and direct. CDE arisings which can be re-used

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
	clearance of temporary laydown and accommodation areas), bituminous materials (removal of the wearing course of the roadways), and concrete (removal of temporary foundations). It is anticipated that these arisings (estimated to be in the region of 13,900 tonnes) will be recovered off site. Wastes anticipated to be disposed of to landfill comprise contaminated materials. The quantities of these waste will not be known until the Construction Stage commences. Quantities and types of waste generated for diversion from landfill and disposal to landfill are presented in Table 27.14 and Table 27.17. **Onshore Cable Corridor** Estimates based on the preliminary design indicate that 70,500 tonnes of arisings will be able to be recycled off-site. This will include aggregate, bituminous materials, concrete and earthworks. A summary of the arising type, quantity and disposal method is provided in Table 27.15. In the region of 26,000 tonnes of waste generated will be disposed of to landfill. This will comprise arising and drilling fluid from the HDD process, contaminated materials from Milton common, spent cable drums and packaging wastes as described in Table 27.18. Due to the absence of space restrictions for the on-shore cable corridor, particularly in the urban areas, it is not feasible to provide storage locations for arisings. As such, arisings generated will transported to suitable waste recovery facilities as they are generated. **Marine Cable Corridor** Off-shore waste generated during construction is anticipated to comprise 48 tonnes of drilling fluid from the HDD process (but only if drilling occurs from onshore to offshore). The fluid disperses to the marine	either on or off site will reduce the impact of waste disposal to landfill. Based on the preliminary design information and using professional judgement, the magnitude of impact is anticipated to be negligible as the Proposed Development is anticipated to generate a less than 1% reduction in regional capacity of waste infrastructure.

Project activity	Potential impacts associated with materials resources/waste	Description of the impacts
	environment, the impacts and potential effects of which are discussed in Chapter 7 (Marine Water and Sediment Quality) of the ES Volume 1 (document reference 6.1.7). No construction wastes are anticipated to be disposed of to landfill. The generation of waste is detailed further in Table 27.16 and Table 27.19.	

Summary of predicted Construction Stage impacts: Materials consumption

27.6.2.10. Across the Converter Station and Onshore Cable Corridor and Marine Cable Corridor, the estimated material quantities required for the Proposed Development are 1,142,275 tonnes. It is anticipated that 77% will be sourced internationally, and 23% from national, regional or local sources. The marine element of the Proposed Development requires the greatest quantity of materials and these may be sourced predominantly from European (non-UK) markets. This is, in part, due to the requirement for the source rock to be from a material that is suitable for long-term backfill, which is typically sourced from the European mainland.

27.6.2.11. The consumption of construction materials is likely to have an adverse impact on the regional and national market resources. Primary materials required for the Proposed Development are a finite resource and are likely to be sourced from local and regional supply, with national or wider sourcing is likely to be required for specialist materials.

27.6.2.12. The sensitivity of material resources in accordance with the criteria set out in Table 27.3 and professional judgement is considered **high**.

27.6.2.13. Based on the scale of the Proposed Development and taking into account the embedded mitigation measures, the magnitude of impact is considered:

- **negligible** during site remediation and preparation as over 50% of the material are likely to be sourced nationally or at a lower geographic scale; and
- **moderate** during construction as over 50% of the primary materials will be sourced internationally, and no mineral safeguarding areas will be sterilised.

27.6.2.14. The significance of effect on material resource consumption during the Construction Stage of the Proposed Development, as set out in Table 27.4 and Table 27.5 is expected to be:

- **slight** and therefore **not significant** during site remediation and preparation; and
- **moderate** during construction and therefore **significant**.

27.6.2.15. Additional mitigation measures are laid out in Section 27.8.

Summary of predicted Construction Stage impacts: Waste generation and disposal

27.6.2.16. The estimated quantity of arisings generated from the Proposed Development is 4,467,981 tonnes. It is anticipated that 99% will be diverted from landfill with 1% (approximately 26,000 tonnes) disposed of as waste to landfill (as detailed in Tables 27.14 to 27.19). This equates to approximately 0.05% of forecast available regional landfill capacity in the year 2024. It is noted that some wastes (contaminated arisings, marine debris and out of service cables) could not be quantified for the purposes of this assessment. However, it is anticipated that the quantity of waste generated for disposal to landfill will continue to be less than 1% of regional remaining capacity forecast for 2024.

27.6.2.17. The largest quantities of arisings which are diverted from landfill comprise earthworks from the Converter Station (199,905 tonnes) which will be re-used on and off site, and sand, gravel and clays from the Marine Cable Corridor (4,155,000 tonnes) which will be deposited into the Marine Cable Corridor.

27.6.2.18. Any wastes which cannot be diverted from landfill are likely to have an adverse, permanent and direct impact on (the reduction of) landfill capacity in the region. The sensitivity of landfill capacity is considered **medium** (for inert waste landfill capacity), **high** (for non-inert waste landfill capacity).

27.6.2.19. Based on the proposed construction method, scale of the Proposed Development, estimated quantities of waste generation to landfill, and subject to the implementation of the embedded mitigation measures, the forecast waste to landfill is anticipated to be less than 1% of the regional remaining capacity in the year 2024 for inert and non-inert wastes. As such, the magnitude of impact is considered **negligible** during both site remediation / preparation and construction.

27.6.2.20. The significance of effect from the Construction Stage of the Proposed Development, as set out in Table 27.4 and Table 27.5, is therefore expected to be **slight** for inert and non-inert waste and therefore **not significant** during both site remediation / preparation and construction.

27.6.3. OPERATIONAL STAGE

Embedded Mitigation

27.6.3.1. The design of the civil and structure elements of the Proposed Development anticipate a 40-year design life, although it is acknowledged that operation is likely to continue beyond this period. As such, the requirement for frequent maintenance and repair work during the design life (and the associated consumption of materials resources and generation and disposal of waste) is anticipated to be minimal.

Impacts

27.6.3.2. The potential impacts associated with material resource consumption (over a minimum 40-year design life) and waste generation and disposal during the operation (considered only for the first year of operation) of the Proposed Development are reported in Table 27.21 in accordance with IAN 153/11 Table C of Annex 2 – Detailed Assessment Reporting Matrix.

Table 27.21 - Potential impacts of consuming material resources and disposing of waste during operation of the Proposed Development

Project activity	Potential impacts associated with material resources/waste	Description of the impacts
Operation and maintenance)	**Material consumption** **Converter Station and Onshore Cable Route** Once operational, the Converter Station, and Onshore Cable Route (including the Telecommunications Buildings and ORS infrastructure) are not expected to require significant maintenance or repair activities during operation. **Marine Cable Route** The Marine Cable Route will require fault and post survey remedial protection during operation. It is estimated that 916,000 tonnes of rock will be required over the 40-year design life.	Any impacts associated with material resource consumption would be adverse, permanent and direct. Using professional judgement, the magnitude of impact is anticipated to be **moderate** as the materials may be sourced from Europe. No sterilisation of mineral safeguarding areas is expected.

	<u>Waste generation and disposal</u> **Converter Station** It is currently considered likely that minimal waste will be generated during operation as the Converter Station will be an unmanned facility. **Onshore Cable Route and Marine Cable Route** The Onshore and Marine Cables have been designed to not require any maintenance. As such, no waste generation is anticipated.	Where any site arisings cannot be diverted from landfill, the impacts associated with disposal of waste would be adverse, permanent and direct. CDE arisings which can be re-used either on or off site will reduce the impact of waste disposal to landfill. Using professional judgement, the magnitude of impact is anticipated to be **negligible**.

Summary of predicted Operational Stage impacts: Materials consumption

27.6.3.3. At this time, it has not been possible to estimate material types and quantities required during operation of the Converter Station and Onshore Cable Route as planned maintenance and repair activities are unscheduled and the level of any repair or refurbishment works cannot be predicted with any accuracy. However, based on professional judgement, the scale of the Converter Station and Onshore Cable Route, any material resource consumption is expected to be minimal.

27.6.3.4. The Marine Cable Route is estimated to require approximately 916,000 tonnes of replacement rock during its design life. The material may need to be sourced from Europe.

27.6.3.5. Any materials required will impact on the consumption of natural resources resulting in the depletion of natural resources and local/regional stocks. The consumption of materials during operation and maintenance phase would therefore be expected to have an adverse, permanent and direct impact on the availability of material resources.

27.6.3.6. During operation, the sensitivity of material resources will remain **high**. The magnitude of impact, based on the anticipated scale of operational works and professional judgement, is considered **moderate** as small volumes of materials will most likely be sourced regionally. The significance of effect of the first year of operation is expected to be **moderate** and therefore **significant**.

Summary of predicted Operational Stage impacts: Waste generation and disposal

27.6.3.7. At this time, it has not been possible to estimate waste generation during the first year of operation as planned maintenance and repair activities at the Converter Station, Onshore and Marine Cable Routes are so far unconfirmed.

27.6.3.8. Using professional judgement and based on experience of developments of a similar scale, the extent of waste generated during the first year of operation is anticipated to be minimal, however any disposal of waste to landfill would impact on landfill capacity and (therein) have the potential to degrade the natural environment. Where site arisings cannot be diverted from landfill, impacts would be adverse and direct, and permanent in nature.

27.6.3.9. During the first year of operation, the sensitivity of landfill capacity will remain **medium** for inert waste and **high** for non-inert waste. The magnitude of impact, based on the anticipated scale of operational works and professional judgement, is considered **negligible** as small volumes of waste will be generated.

27.6.3.10. The significance of effect of the first year of operation is therefore expected to be **neutral** for inert waste and **slight** for non-inert waste and therefore **not significant** in both cases.

27.6.4. DECOMMISSIONING STAGE

27.6.4.1. Materials consumption, and arisings and waste production during decommissioning have been scoped out, as their impacts and associated effects have been deemed to be not significant. Furthermore, the materials required for, and disposal routes of waste generated are not known as they are deemed to be too far into the future. Accordingly, this chapter and its assessment have been produced on the presumption that - through the advancement of technologies and processes for reclaiming and recovering materials in the future the Proposed Development will take into account the increasing drive towards a circular economy - good and best practice techniques will be applied at end-of-life and adverse environmental effects will be duly minimise at this lifecycle stage.

27.7. CUMULATIVE EFFECTS

27.7.1.1. The potential for cumulative impacts has been considered for the construction and operational stages of the Proposed Development and presented in Appendix 27.3 (Cumulative Effect Assessment Matrix (Stage 1 & 2)) and 27.4 (Cumulative Effect Assessment Matrix (Stage 3 & 4)) of the ES Volume 3 (document reference 6.3.27.3 and 6.3.27.4 respectively).

27.7.1.2. Three potentially significant cumulative impacts have been identified, in relation to the flood and coastal erosion management schemes between Ports Creek Railway Bridge and Kendall's Wharf, Portsmouth; at Milton Common, Portsmouth; and at Southsea Seafront. These have been identified as a possible significant cumulative effect due to the flood and coastal erosion management scheme being within the ZOI of the Proposed Development for waste and materials resources, and the potential for rock material used during construction and operation to be sourced from outside the UK, which comprises a significant effect. At this time, the availability of information on the source of rock materials required for the flood and coastal erosion management schemes is not sufficient to permit a full assessment of cumulative impacts, however, this does not change the status of the post-mitigation significant effect described in this chapter.

27.7.1.3. No Intra Project Cumulative Effects with relation to waste and materials have been identified.

27.8. PROPOSED MITIGATION AND ENHANCEMENT

27.8.1.1. Construction and Operational Stage effects from waste generation and disposal have been identified as **not significant**, therefore no further mitigation measures are required.

27.8.1.2. The assessment has identified construction and Operational Stage effects to be **significant** in relation to consumption of material resources.

27.8.1.3. The Marine Cable Route of the Proposed Development requires rock for backfill, non-burial protection, pre- and post-lay bunds (during construction) and for remedial protection during operation.

27.8.1.4. To help identify a sustainable source for this material through mitigation, the appointed contractor will record decisions (made by consensus, and taking into account the associated economic and environmental factors) which have been made to ascertain whether or not the source of rock required for the Marine Cable Route can originate from the UK and whether the impact of using such rock originating from the UK is lower than using material imported from an international source. This measure will be required for both construction and operational stages of the Proposed Development.

27.8.1.5. It is considered that the embedded mitigation measures in place for the Converter Station and Onshore Cable Corridor are sufficient, however, the following further actions have been committed to as part of the preliminary design stage:

- Maximise use of recycled materials where practicable and as identified within the Outline CEMPs.
- Manage waste in accordance with the waste hierarchy to minimise waste generation and disposal to landfill as identified within the Onshore Outline CEMP.

- Completion of ground and local environment inspections and surveys to determine the nature of the ground, to identify its potential to be diverted from landfill;
- Monitoring measures to be adopted across the Proposed Development would include, as a minimum, the implementation of a CEMP, incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP') by the contractor, once appointed. Associated data, information and reports will be used to evidence monitoring undertaken;
- Spoil and waste segregation and containment will be provided on temporary Laydown Areas within the Converter Station Area;
- Sufficient storage space will be allocated by the construction contractor to allow waste to be properly segregated;
- The detailed design and construction aspects will follow British Standard 8895 (Designing for material efficiency in building projects) and other published guidance such as BRE materials resource efficiency in construction;
- Off-site fabrication will be utilised where practicable;
- The construction contractor will be encouraged, where practicable, to order material with less or returnable packaging;
- The Converter Station will (at end of life) be decommissioned in accordance with the current waste disposal regulations in force at that time;
- The Marine Cable is designed, manufactured and installed for a minimum service life of 40 years, however, it is likely that the Marine Cable (and other elements of the Proposed Development) will continue to operate beyond this period. When the Marine Cable is decommissioned, in some instances, the least environmentally impacting option may be to leave the cable in-situ. The final decommissioning plan is still to be determined, and will depend on requirements and the marine environment at the time; and
- If removal of Onshore Cables occurs during decommissioning, every effort will be made to re-use and recycle as much material as practicable.

27.8.1.6. The following further actions as identified within the Onshore Outline CEMP are recommended to ensure good and best practice are achieved:

- Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products.

- Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content.
- Design for off-site construction: Maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction.
- Identify opportunities to minimise the export and import of material resources.
- Detailed design for recovery and reuse: identifying, securing and using material resources at their highest value, whether they already exist on site, or are sourced from other schemes
- Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse.
- Working to a proximity principle, ensuring arisings generated are handled, stored, managed and re-used or recycled as close as practicable to the point of origin.

27.9. RESIDUAL EFFECTS

27.9.1.1. Based on the Proposed Development design and associated embedded mitigation measures, this assessment identified no significant effects in relation to waste generation and disposal to landfill.

27.9.1.2. In relation to material resource consumption, the requirement for specialist rock material for the marine element, has resulted in a significant effect.

27.9.1.3. The methodology used for the assessment of effects from Waste and Material Resources in this chapter is drawn from guidance produced by Highways England. Whilst the Highways England guidance is designed predominantly for road infrastructure schemes, it constitutes (at the time of writing) the only available published guidance on the subject. The guidance has therefore been applied to all aspects of the Proposed Development, although it should be acknowledged that there are natural limitations to its suitability for the marine (off-shore) elements.

27.9.1.4. Accordingly, the assessment has used a 'worst case scenario' approach that assumes that the rock required for the off-shore elements of the Proposed Development will be sourced from Europe. In a post-mitigation scenario, if the source of rock for the Marine Cable Route remains Europe, and the proposed additional mitigation is not sufficient to reduce the magnitude of impacts, the associated effects would remain significant adverse, in line with the criteria set out in the agreed assessment methodology.

27.9.1.5. Should this be the case, the following justification is provided to demonstrate that mitigation has been practicably maximised and impacts maximally reduced, despite the (residual) significant adverse effect:

- The rock required for the marine elements of the Proposed Development is a specialist product that must meet design specifications for grading, hardness and type. Within the UK, facilities for sourcing such material are limited, and typically available only to developments local to the loading infrastructure. Furthermore, the loading facilities in the UK often utilise rock imported from Europe. It has been also being determined that European loading facilities are considered to be better placed to manage the handling of rock material due to their deep water coastal locations.
- Accordingly, professional judgement has been used to assert that international sourcing of rock material would be a suitable option, subject to the proposed mitigation set out in Section 27.8, and approved by the client, to demonstrate selecting resource from within the UK offers no economic or environmental benefit compared to that which is available in Europe.

27.9.1.6. The following table provides a summary of the findings of the assessment.

Table 27.22 – Summary of Effects Table for Waste and Material Resources

Description of Effects	Receptor	Significance and Nature of Effects Prior to mitigation	Summary of Mitigation/Enhancement	Significance and Nature of Residual Effects following Mitigation/Enhancement
Construction Stage				
Material resource consumption during site remediation/ preparation	Primary materials	No significant effects identified. - / P / D / LT	No mitigation required.	Not significant - / P / D / LT
Material resource consumption during construction	Primary materials	Significant, specifically in relation to marine rock material requirements - / P / D / LT	The appointed contractor will record decisions (made by consensus, and taking into account both economic and environmental factors) which have been made to identify whether or not the source of rock required for the Marine Cable Route can originate from the UK and whether the impact of using such rock originating from the UK is lower than using material imported from an international source	May remain significant if the appointed contractor cannot identify an appropriate UK source given the specialist nature of the marine rock material or using imported rock is still less impactful. - / P / D / LT

Disposal of waste to landfill during site remediation / preparation	Landfill capacity	Embedded mitigation results in this assessment finding no significant effects. - / P / D / LT	No mitigation required.	Not significant - / P / D / LT
Disposal of waste to landfill during construction	Landfill capacity	Embedded mitigation results in this assessment finding no significant effects. - / P / D / LT	No mitigation required.	Not significant - / P / D / LT
Operational Stage				
Material resource consumption (40-year design life)	Primary materials	Significant, specifically in relation to marine rock material requirements - / P / D / LT	The appointed contractor will record decisions (made by consensus, and taking into account both economic and environmental factors) which have been made to identify whether or not the source of rock required for the Marine Cable Route can originate from the UK and whether the impact of using such rock originating from the UK is lower than using material imported from an international source	May remain significant if the appointed contractor cannot identify an appropriate UK source given the specialist nature of the marine rock material or using imported rock is still less impactful. - / P / D / LT

Disposal of waste to landfill (first year of operation only)	Landfill capacity	No significant effects identified. - / P / D / LT	No mitigation required.	Not significant - / P / D / LT

Key to table:

+ / - = Beneficial or Adverse P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable

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