CHAPTER 11 WASTE RESOURCES

11. WASTE RESOURCES

11.1. This Chapter of the ES examines waste management and controls associated with the construction and operation of the Proposed Development.

11.2. The Green Lithium Refining Limited Process has been designed to ensure that the principal by-products generated by the process are produced to a standard that allows the re-use as a secondary aggregate material within the construction industry. This aspect of the process design is fundamental in ensuring that the Lithium Production process meets the applicants' requirements in regards to environmental sustainability and can also demonstrate Best Available Techniques.

11.3. There is a great deal of regulatory, financial and stakeholder pressure to manage wastes sustainably and to avoid needless disposal to landfill wherever possible. This chapter considers these factors in the context of the Proposed Development, assessing the waste characteristics of the current site use and the Proposed Development in order to evaluate potential impacts and identify options for sustainable waste management in line with the '*Waste Hierarchy*' .

11.4. Due to the nature of the Proposed Development utilising a Zero Liquid Disposal (ZLD) process, alongside consideration for reducing produced waste streams, there will not be any waste from the operational phase of the development. The primary by-products produced by the plant will be analcime sand and salt, analcime sand is able to be utilised and sold onto the construction sector, with the salt utilised as road salt for de-icing purposes.

11.5. Given the process produces very few genuine waste products, the development aligns with much of the national legislation surrounding this topic. It can be seen that the Proposed Development prioritises reuse of materials alongside recycling, showing alignment with the waste hierarchy (Figure 11.1) and the Environmental Protection Act 1990.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

11.6. The waste management evaluation has considered the wastes that are likely to be generated as a result of the Site usage for its normal business and the construction site preparation related wastes.

11.7. For the construction phase, consideration has been given to the potential wastes that will be produced. On-site practices will aim to minimise the use of raw materials and maximise the use of secondary aggregates, recycled and/or renewable materials.

11.8. The methodology for looking at operational wastes has involved predicting waste generation activities associated with the redeveloped site.

11.9. The potential effects have been classified, prior to mitigation, as minor, moderate or major (either "Adverse", "Beneficial" or "Neutral"). Where the predicted effects are considered to be significant, mitigation measures have been incorporated to eliminate or reduce the impacts to an acceptable level.

LEGISLATION, PLANNING POLICY AND GUIDANCE

European Policy & Legislation

11.10. The UK was a participant at the 1992 Earth Summit in Rio de Janeiro hosted by the United Nations Conference on Environment and Development (UNCED) and at the Global Climate Change conference at Kyoto in 1997. The UK government has ratified and agreed to implement many of the objectives agreed at these international meetings. In particular, the UK signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

11.11. The commitments included reducing waste generation, increasing the amount of recycling and re-use, reducing dependence on techniques such as landfill and reducing carbon dioxide emissions resulting from combustion of fossil fuels.

11.12. The European Commission's Waste Framework Directive (2008/98/EC) sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

11.13. The Waste Framework Directive also requires the development of national waste management plans as the cornerstone of any national, regional or local policy on waste management.

11.14. The 1999 Landfill Directive (1999/31/EC as amended by 1882/2003 EC) was introduced in order to prevent, or reduce as far as possible, the negative effects of landfilling waste. It requires Member states to draw up strategies for a reduction in the quantity of bio-degradable municipal waste (BMW) disposed of to landfill.

National Policy and Legislation

11.15. The Government Review of Waste Policy in England that was published in 2011 outlines the proposed sustainable approach to the use of materials, delivering environmental benefits and supporting economic growth through the:

- Prioritisation of the efforts to manage waste in line with the waste hierarchy and reduce the carbon impact of waste;
- Developing a range of measures to encourage waste prevention and reuse, supporting greater resource efficiency;
- Developing voluntary approaches to cutting waste, increase recycling, and improve the overall quality of recycled material, working closely with business sectors and the waste and material resources industry; and
- Consulting on the case for higher packaging recovery targets for some key materials.

11.16. Controlled Waste Regulations 1992, as amended by Controlled Waste Regulations 1993 define controlled waste for the purposes of EPA 1990 Part II, which introduced three categories of controlled wastes: household, industrial and commercial. Most wastes from households, industry, commerce and construction activities are controlled wastes, including wastes destined for recycling.

11.17. The Environmental Protection Act 1990 also requires local authorities to contract out waste disposal. Their responsibility for waste management is exercised through control of these contracts and through their duties as waste collection authorities.

11.18. Regulation of waste disposal became the responsibility of the Environment Agency in April 1996, and is undertaken chiefly through Environmental Permitting (EPR) systems.

11.19. The Environmental Permitting (England and Wales) Regulations 2010 implement the European Landfill Directive (Directive 1999/31/EC on the landfilling of waste) and Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills. The Directive is an instrument for driving waste up the hierarchy through waste minimisation and increased levels of recycling and recovery, whilst also be the key UK legislative instrument outlining the legal obligation for all operators who commercially and treat commercial waste streams.

11.20. The National Planning Policy Framework (NPPF) (March 2012) and the National Waste Management Plan for England (published 2013) replaces many Planning Policy Statements (PPS), Planning Policy Guidance (PPG) and Mineral Planning Guidance (MPG) documents. These documents set out guidance for all those

involved in making decisions about the management of waste and rely on the waste hierarchy principle to bring waste management in line with the objectives of sustainable development.

11.21. Although a Site Waste Management Plan (SWMP) does not form a legal requirement for the site, a detailed SWMP will be produced as part of the site's Construction Environmental Management Plan (CEMP).

Resources and Waste Strategy for England

11.22. The Resources and Waste Strategy for England was announced on 18 December 2018. The strategy sets out plans to double resource productivity and eliminate avoidable waste of all kinds by 2050.

11.23. The Resources and Waste Strategy for England was announced on 18 December 2018. The strategy sets out plans to double resource productivity and eliminate avoidable waste of all kinds by 2050.

11.24. The strategy sets out how to:

- Preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy;
- Minimise the damage caused to our natural environment by reducing and managing waste safely and carefully; and
- Deal with waste crime.

11.25. The DEFRA Strategy combines actions which will be taken now and provides firm commitments for the coming years and gives a clear longer-term policy direction in line with the 25 Year Environment Plan.

LOCAL POLICY

Redcar and Cleveland Local Plan

11.26. Cleveland County Council produced and adopted the Redcar & Cleveland Local Plan in 2018 (Ref 11.1). This Strategy sets clear policy and actions to build and successful and sustainable future County Cleveland.

11.27. One of the main objectives for the plan is sustainable development and encouragement of regional recycling, the plan states:

- *Objective: Sustainable Development* – This policy favours developments that improve the economic, social and environmental development of an area. Any Proposed Development that demonstrates a commitment to the RCBCs identified sustainability principles will be looked upon favourably by RCBC and will be more likely to succeed in the planning process.

- *Objective: Alternative Materials for Aggregates Use* - This policy is in relation to sourcing and the production of materials used as alternatives for primary aggregates, including sand gravel. This policy will support applications which are proposing developments including this practise.

11.28. The Proposed Development meets Policy MWC3 – Alternative Materials for Aggregates Use and Policy SD4 – General Development Principles which are found in the Local Plan, alongside the national legislation as previously stated.

11.29. The introduction of a LHM Refinery at Teesside is in line with policies for the following reasons:

- The process employs a ZLD strategy, meaning that there is no process effluent, showing alignment with sustainability policies as the process will not be polluting the neighbouring Teesmouth Estuary or River Tees via controlled waters, and has taken consideration of methods to reduce the waste produced;
- The objective of recycling the analcime sand as a novel material for use in the aggregate material further aligns with these policies, by increasing the sustainability of the process due to less waste created, and by providing alternative materials for aggregate use; and
- Throughout the planning submission it has been shown that consideration towards how waste outputs could be both minimised and managed sustainably, aligning with Policy SD4.

11.30. It should also be noted that in-line with Tees Valley Joint Minerals and Waste DPDs (Ref 11.2), the Proposed Development shall apply the waste hierarchy, as outlined in Figure 11.1, where disposal to landfill is considered as the last choice.

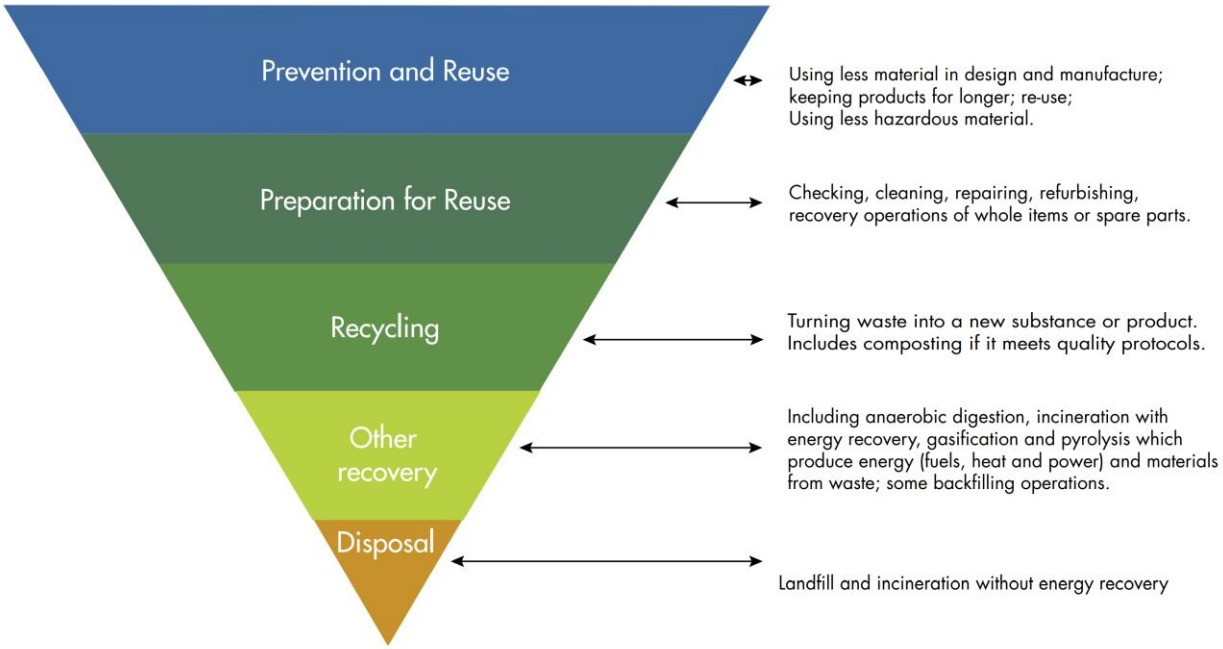

Figure 11.1: Waste Hierarchy

BASELINE CONDITIONS

11.31. The Site currently consists of a container storage area encompassing the northern half, located on hardstanding (consisting of porous tarmac), used by PD Teesport, and an area of recovered mixed grassland to the south, which is an area of approximately 8 ha.

11.32. Detailed site description is provided within the Planning Statement.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

11.33. For the Proposed Development site, the anticipated waste types that are predicted during the construction phase are:

- Excavated soil associated with foundation excavation and trenching for services;
- Spoil from piling operations (if required);
- Excavated tarmac surfacing;
- Vegetation from site stripping;
- Waste water from vehicle wheel wash;

- Waste paper, plastic, cardboard and wood from delivery of construction material and site activities during the works;
- Redundant unused construction materials; and
- Collected groundwater and rainwater.

11.34. For the Proposed Development site, the anticipated waste types that are predicted during the operational phase are:

- Dust filters from flue gas cleaning equipment (i.e., Air Pollution Control (APC) residues);
- Analcime Sand;
- Salt;
- Paper, cardboard and plastic packaging wastes;
- Waste vegetation from routine maintenance of landscaped areas;
- Construction/demolition wastes from periodic contractor activities; and
- Sanitary effluent.

11.35. The volume of the wastes that will be generated cannot be specified at this time. It is possible, however, to give a relative assessment of the potential waste types, quantities and their intended fate both during the construction and operational phases (Table 11.1).

Table 11.1: Waste Types and Environmental Fate

Waste Type	Phase	Relative Volume and Time Interval	End Treatment/Use
Excavated soil	Construction	Small	On-site reuse and re-profiling. Off-site disposal for materials that cannot be managed on-site effectively, with a possibility of sale if of reasonable quality.
Excavated tarmac	Construction	Small	Will be recycled as fill as well as off-site disposal.
Redundant construction materials	Construction	Small	Return to supplier, recycling, sale or disposal.
Collected perched groundwater and rainwater	Construction	Small	Discharge to site surface or drainage system under controlled conditions if suitable or off-site treatment.

Table 11.1: Waste Types and Environmental Fate			
Waste Type	Phase	Relative Volume and Time Interval	End Treatment/Use
Trade effluent from vehicle wheel washing	Construction	Small	Discharge to foul sewer under controlled conditions to be agreed with Northumbrian Water Limited.
Waste paper, plastic, cardboard and wood	Construction	Small to moderate	Off-site recycling and disposal via contracted waste management firm.
Waste oils, chemicals and potentially hazardous materials	Construction and operational	Small	Removal to licensed treatment and disposal facilities.
Scrap metal and redundant plant and equipment	Construction and operational	Small	Off-site recycling.
Vegetation from site stripping	Construction and operational	Small	Off-site recycling or composting.
Sanitary waste water	Construction and operational	Small	Discharge to foul sewer under controlled conditions to be agreed with Northumbrian Water Limited.
Dust filters from flue gas cleaning equipment (i.e., Air Pollution Control (APC) residues)	Operational	Small to Moderate	Removal to licensed disposal/recycling facility.
General waste; paper, plastic, cardboard, food waste etc.	Operational	Small	Segregated for recycling off-site and treatment of non-recyclables on-site.
Salt Cake	Operational	Large	Discharged in batches from processing for removal/disposal by a contractor, sell to industry and Highways department for road grit/salt.
Analcime Sand	Operational	Large	Used as a novel aggregate material, sold to surrounding construction businesses as a sustainable recycled product.
Construction wastes from periodic contractor activities.	Operational	Small	Removal to licensed treatment and disposal facilities.
Key: Construction related wastes will only be generated during the construction period. The associated time interval of waste generation will ultimately depend upon the length of the construction period. Small = tens of tonnes/per annum Moderate = hundreds of tonnes/per annum Large = thousands of tonnes/per annum			

Solid Waste Generation and Management

Construction Phase

11.36. Excavated soils associated with the site clearance and construction works will be the dominant and most environmentally significant waste stream, however, it will be temporary in nature. Insofar as a summary of the management of wastes arising from the Proposed Development is concerned, the following aspects are pertinent:

- The CL:AIRE *'Definition of Waste: Development Industry Code of Practice'* (DoWCoP) Version 2 (Ref 11.3), as issued in March 2011 will be used to assess whether excavated materials are classified as waste or not. If excavated materials are dealt with in accordance with the CoP, the EA considers that these materials are unlikely to be waste if they are used for the purpose of land development. An integral part of the CoP is the production of a Materials Management Plan (MMP) which documents how all of the material to be excavated is to be dealt with. The recovery and re-use of materials will be in accordance with the Waste Management Licensing Regulations 2011 (as amended).
- Development of a Site Waste Management Plan (SWMP), in-line with best practice guidance the requirements will be produced as part of the sites Construction Environmental Management Plan (CEMP). The main objectives of which will to make sure that all building materials are managed efficiently, that waste is disposed of legally, and that material recycling, re-use and recovery is maximised.
- All excavations will be monitored and analysed by qualified and experienced field scientists to ensure the chemical characteristics of the materials are understood and that they are handled and segregated appropriately (e.g., contaminated soils will not be mixed with uncontaminated soils).
- Arisings from piling operations, if required, will be treated similarly to other excavated materials and will be appropriately monitored, analysed and managed.
- Detailed records (and where appropriate a photographic log) will be kept of all construction phase waste arisings and their management and fate. This will be recorded as part of the SWMP and CEMP.

11.37. Overall, the generation and management of solid waste associated with the construction phase is considered to have a minor adverse effect which will be temporary in nature.

Operational Phase

11.38. The facility will receive α - spodumene concentrate for refining into LHM, including a series of calcination and mechanical / chemical processing.

11.39. The plant has zero waste streams from processing, with the outputs of the processing containing two by-products, the largest of these (estimated at circa 714,000 tonnes per annum based on input of 510,000 tonnes per annum) will be analcime sand. All analcime produced by the refinery will be tested for composition and used off site as a secondary aggregate material (i.e., recycled) where possible.

11.40. The materials will be removed off-site for direct use in the aggregate industry by train or sea.

11.41. The other output of the process, which is not the final product of LHM, is salt, estimated at 9,450 TPA. This will be utilised for Road Grit and sold to the local council.

11.42. The Lithium Refinery process meets the definition of a Part A(1) Installation as defined by the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 and will require an Environment Agency permit to operate as a Part A(1) process. As part of the permit application process the EA will require the operator to demonstrate that all material processing, storage, handling and wastes activities will be managed in accordance with best available techniques (BAT) and be fully recovered or recycled, as far as is practicable. .

Waste Water Generation and Management

11.43. In addition to the generation of solid wastes, the Proposed Development will also generate a small volume of wastewater. As with most aspects of the Proposed Development, the construction and operational phases need to be considered separately. These are discussed below.

Construction Phase

11.44. Waste waters likely to be generated on-site during the construction phase include the following:

- Temporary septic tanks and/or portable toilets to be utilised by the construction workers;
- Waste waters from dewatering of excavations (groundwater and surface water runoff); and
- Dirty water from the temporary on-site wheel wash (should one be required during the construction works).

11.45. Temporary portable toilet units will be emptied frequently under a maintenance contract. The waste from the units will be taken off-site for treatment and disposal at a local municipal wastewater treatment works.

11.46. Any water arising from the dewatering of excavations will be discharged back over the ground surface and allowed to infiltrate. All works will be undertaken with due attention to appropriate guidance including the now withdrawn EA Guidance for Pollution Prevention PP5: Works and Maintenance in or Near Water (Ref 11.4).

11.47. Waste water generated from the on-site wheel wash (if required) will be either be collected in a sealed system for reuse, or collected in a sealed system for authorised disposal, following the guidance set out in Pollution Prevention Guideline PPG13: Vehicle Washing and Cleaning (Ref 11.5).

11.48. To ensure best practice is achieved, in-line with current sustainable construction practices, Waste and Resources Action Programme (WRAP) guidance (Ref 11.6) will be utilised during the design, procurement and construction phases. Best practice recommendations will be incorporated within the formally documented Site Waste Management Plan (SWMP).

11.49. Overall, the generation and management of waste water associated with the construction phase are considered to have a potential **minor adverse effect** which will be **temporary** in nature.

11.50. All construction phase waste water will be comprehensively managed and controlled as part of a Construction Environmental Management Plan (CEMP).

Operational Phase

11.51. The main waste water stream once the site is operational will be associated with the sanitary wastewater system. All sanitary waste water will be discharged to the foul sewer under controlled conditions to be agreed with Northumbrian Water Limited.

11.52. The process will employ a ZLD system, meaning that process effluent is treated without discharging to controlled waters, instead it is fed into a Wastewater Crystallizer system which is a forced circulation, mechanical vapor recompression (MVR) driven system. Essentially this takes process effluent and removes both heat and chemicals. With precipitation of Lithium Sulfate alongside other chemicals before it is turned to vapor, with the final waste product of the process being analcime sand, which is removed after the hydrometallurgy process. The ZLD also produces an industrial salt as a by-product.

11.53. Overall, the generation and management of waste water associated with the operational phase is considered to have a **negligible effect**.

ASSESSMENT OF CUMULATIVE EFFECTS

11.54. There are no cumulative effects from any schemes with respect to waste management.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Enhancement / Mitigation

11.55. The measures to be taken to manage wastes generated during the construction and operational phases are described above. No additional mitigation measures are considered to be required.

11.56. The measures to be taken to manage waste waters generated during the construction and operational phases are described above. No additional mitigation measures are considered to be required.

11.57. All waste transfer documentation shall be maintained by the Principal Contractor for the required statutory period (i.e., two years for general waste and three years for special waste).

RESIDUAL EFFECTS

Construction Phase

11.58. Sustainable solutions (in-line with WRAP current guidelines) will be implemented to enable, as far as practicable, the re-use of waste materials and avoidance of landfill disposal.

11.59. The effects arising from the demolition and construction phase are transient in nature and as such the effects are negligible.

Operational Phase

11.60. All waste produced during the operational phase will be stored in infrastructure designed and installed to meet best available techniques (BAT) pollution prevention requirements, the primary waste product of analcime sand is also expected to be recycled into a secondary aggregate material for use in the local area. The operation of the plant will also be regulated by the EA. As such, the residual effect of the operational phase is **Negligible.**

SUMMARY

11.61. The LHM refinery plant does not produce any waste material that cannot be otherwise reused, recycled or disposed with minimal impact.

11.62. The facility will require a Part A(1) Environmental Permit and be regulated by the Environment Agency in accordance the Environmental Permitting Regulations 2018.

11.63. As part of the permit application process the Environment Agency will require the operator to demonstrate that all wastes generated will be re-cycled, as far as is practicable, and that wastes are handled in accordance with best available techniques (BAT).

11.64. In addition, it will be necessary for the Operator to satisfy the Environment Agency that their proposed techniques for collecting, handling and storing waste materials will be adequately controlled.

11.65. Table 11.2 overleaf shows a summary of the Proposed Development s Waste Management.

Table 11.2: Waste Management Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Demolition rubble and excavated soils associated with site clearance and construction works	Temporary	Minor Adverse	On-site re-use of materials and off-site recycling or disposal of unsuitable materials. A Site Waste Management Plan will ensure material recycling, re-use and recovery is maximised.	Neutral
Operational solid wastes produced as per the day to day running of the Proposed Development	Long Term	Neutral	The majority of waste streams will be able to be re-used off site. The waste operations will be permitted and regulated by the EA	Neutral
Wastewaters generated during the construction phase	Temporary	Minor Adverse	The discharge of any water accumulated in excavations to any controlled waters would be subject to EA approval and require monitoring. Sanitary wastes are to be tankered off-site to an appropriate treatment facility.	Neutral
Wastewaters generated during the operational phase of the Proposed Development	Long Term	Neutral	Waste water will be discharged to the foul sewer under controlled conditions to be agreed with Northumberland Water Limited.	Neutral

REFERENCES

REF 11.1: Redcar and Cleveland Local Plan Adopted 2018 Cleveland County Council, May 2018 (Local Plan).

REF 11.2: Tees Valley Joint Minerals and Waste Development Plan Documents Adopted September 2011 (Cleveland Core Strategy DPD)

Ref 11.3: CL:AIRE (2011), 'Definition of Waste: Development Industry Code of Practice (CoP)' Version 2, March 2011.

REF 11.4: Environment Agency Guidance: Works in, near or over watercourses, PPG5: prevent pollution How to prevent pollution and comply with the law when planning construction, maintenance or other works in, near or over watercourses. Published by the Environment Agency - Published 1 November 2007 (Last updated 15 April 2014)

REF 11.5: EA Guidance: Vehicle washing and cleaning, PPG13: prevent pollution Advice on preventing pollution and complying with environmental law when washing and cleaning vehicles. Published by the Environment Agency - Published 1 July 2017

REF 11.6: Waste and Resources Action Programme (WRAP), Practical solutions for sustainable construction, Achieving good practice Waste Minimisation and Management Guidance for construction clients, design teams and contractors.