HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.3.6 ES Volume C - Project-wide effects C6 - Project-wide effects – Waste and materials management

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6 Waste and materials management

6.1 Introduction

6.1.1 This chapter describes the assessment of the potential project-wide waste and materials effects.

6.1.2 The management of radioactive wastes which arise from the operation of the Power Station is addressed separately in appendix D14-1 (radioactive waste) (Application Reference Number: 6.4.97) and is not considered in this chapter.

6.1.3 Please refer to chapter B16 (waste and materials management) (Application Reference Number: 6.2.16) for the technical basis for the assessment including a summary of legislation, policy and guidance; key points arising in consultation that have guided the waste and materials management assessment; and assessment methodologies and criteria.

6.2 Study area

6.2.1 This section describes the study area relevant to the project-wide waste and materials assessment.

6.2.2 The basis for the study area adopted for the purposes of this assessment is outlined in chapter B16 (Application Reference Number: 6.2.16). The study area includes all land within the footprint of the Wylfa Newydd Project where materials and waste may be generated. For waste, which would be managed on a regional level, the study area for these receiving waste management facilities is selected based on the nearest appropriate installation principle. This ensures waste is disposed of or recovered using the most appropriate method and technologies. Any waste not treated or disposed of in north Wales is likely to be transported to northwest England given the road network, the proximity to north Wales and the availability of waste management infrastructure.

6.3 Baseline environment

6.3.1 This section provides a summary of the baseline conditions for waste and materials within the study area described in section 6.2.

6.3.2 To establish the baseline conditions for the waste assessment, a desk-based study using information obtained through publicly available sources and from government agency publications has been undertaken to identify the type, capacity and throughput of existing waste management infrastructure at a regional level (within north Wales and northwest England).

6.3.3 For a project of this size, waste is typically considered in the context of its impact at a regional level because local facilities would rarely be capable of servicing a major infrastructure project. Therefore, this assessment has been considered at a regional level to determine the overall impact. However, as part of the process, and through consultation with stakeholders, the potential impact that the Wylfa Newydd Project may have on more local

waste management infrastructure has been recognised. Therefore, outside of this assessment a detailed review of the impact at a more local level, both on the Isle of Anglesey and within Gwynedd, has been carried out and has been included in appendix C6-1 (local and regional waste management facilities) (Application Reference Number: 6.3.30).

6.3.4 Further information on the management of dredged material and the Deep Disposal of this at the newly licensed Holyhead North (IS043) Disposal Site can be found in chapter D13 (the marine environment) (Application Reference Number: 6.4.13).

North Wales waste management infrastructure

6.3.5 Natural Resource Wales (NRW) grants environmental permits to sites for the treatment and disposal of waste. These permits define the waste types, tonnage and activities that can be carried out at the waste management facility. The total annual permitted capacities in 2016 of waste management sites in north Wales [RD1] are detailed in table C6-1. Further details of the various waste management facilities in north Wales along with their location, distance from the development site, operator and capacity are provided in appendix C6-1 (Application Reference Number: 6.3.30).

Table C6-1 Waste management permitted capacity in north Wales 2016 [RD1]

Facility type	Waste categories	Isle of Anglesey	Gwynedd	Conwy	Denbighshire	Flintshire	Wrexham	Total
		Tonnes per annum						
Anaerobic digestion	Non-hazardous	-	11,500	-	-	-	-	11,500
In-vessel composting	Non-hazardous	24,999	24,999	-	-	-	25,000	74,999
Open windrow composting	Non-hazardous	4,999	24,999	24,000	-	15,000	24,999	93,997
Waste recycling facility including construction, demolition, commercial and industrial	Non-hazardous	-	-	24,999	-	350,000	-	374,999
Metal recycling site	Non-hazardous	24,999	152,498	-	24,999	134,996	49,998	387,490
Use/treatment of inert waste for land reclamation or construction	Inert	109,999	99,999	49,999	684,997	421,499	174,998	1,541,491
Inert landfill site	Inert	32,000	75,000	99,000	-	-	-	206,000
Total		196,996	388,995	197,998	709,996	921,495	274,995	2,690,476

The information above has been taken from [RD1]. All transfer facility information has been removed. Any identified double counting has been removed. Where a facility has multiple uses, only the relevant tonnages have been included above. [RD1] also identifies 44,999 tonnes of non-hazardous landfill capacity within Gwynedd. However, as these site did not accept any waste in 2016, they have been discounted for the purposed of this assessment.

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6.3.6 It should be noted that table C6-1 does not include any tonnage capacity for transfer facilities within north Wales as of 2016. The capacity of transfer facilities has not been included in the assessment because the assessment considers final treatment/disposal points for waste. While the transfer of waste is not considered, it is acknowledged that transfer stations are commonly used for the bulking and onward transfer of waste to other regional facilities. North Wales had approximately 2,462,300 tonnes per annum of transfer facility capacity in 2016 [RD1]; it is likely that some of this capacity would be available. This could potentially be used to manage some of the waste that would be generated by the Wylfa Newydd Project and taken off-site.

6.3.7 There are currently no hazardous waste landfills in north Wales. This means that, unless new capacity becomes available in the region, any hazardous waste produced by the Wylfa Newydd Project would need to be disposed of in hazardous waste landfills outside of north Wales.

6.3.8 In addition to the capacity detailed in table C6-1 above, there are a number of newer facilities proposed in north Wales that would not have been captured in the NRW statistics published in 2016. These include:

- the Mona Anaerobic Digestion Plant, which has a potential capacity of 49,500 tonnes per annum and is due to be operational in 2017/2018; and
- the Parc Adfer incinerator at Deeside, which has a potential capacity of 200,000 tonnes per annum and is due to be operational in 2019 (a permit was granted by NRW in October 2015 and the facility is currently under construction).

6.3.9 Whilst landfill (as the worst case) has been assumed for wastes that cannot be reused or recycled within the assessment it should be noted that incineration with energy recovery would be preferable and in accordance with *Towards Zero Waste* [RD2] and the waste hierarchy.

Northwest England waste management infrastructure

6.3.10 Currently, there is limited landfill capacity within north Wales. Any waste that is destined for landfill is likely to need to be disposed of outside of north Wales. Northwest England has been included within the assessment given its proximity to the project and north Wales.

6.3.11 As reported by the Environment Agency in northwest England in 2016 [RD3], the status of total landfill capacity was as follows:

- 39,335,000m^3 of non-hazardous landfill capacity;
- 6,680,000m^3 of inert landfill capacity; and
- 6,481,000m^3 of hazardous merchant landfill capacity.

6.3.12 There is currently no non-hazardous waste landfill capacity considered to be available to the Wylfa Newydd Project in north Wales. This means that, unless new capacity becomes available in the region, any non-hazardous waste produced by the Wylfa Newydd Project would need to be disposed of

in non-hazardous waste landfills outside of north Wales. The nearest non-hazardous waste landfill sites are Gowy Landfill Site, Chester (160km), Arpley Landfill Site, Warrington (180km) and Maw Green Landfill Site, Crewe (190km).

6.3.13 There are currently no hazardous waste landfills in north Wales. This means that, unless new capacity becomes available in the region, any hazardous waste produced by the Wylfa Newydd Project would need to be disposed of in hazardous waste landfills outside of north Wales. The nearest hazardous waste landfill sites are Randle Landfill Site in Runcorn, Cheshire (170km), Bostock Landfill Site in Middlewich, Cheshire (180km) and Whitemoss Landfill Site, in Skelmersdale, Lancashire (210km).

6.3.14 There are currently no energy from waste facilities in north Wales, however, there are 1,466,000 tonnes of capacity within facilities in northwest England [RD3]. As stated above, the Parc Adfer incinerator is due to be operational in 2019 and would add 200,000 tonnes of capacity in north Wales. Again, it should be noted that, for the purposes of this assessment, whilst landfill is considered as the worst-case disposal route, incineration with energy recovery would be a more preferable management route and in accordance with the waste hierarchy.

6.3.15 Although the waste management facilities' permitted capacity in 2016 for north Wales and northwest England is known for the current waste infrastructure, it is not possible to confirm at present which specific waste facilities or combination of waste facilities would be used for the Wylfa Newydd Project; therefore, only the overall capacity in the market has been assessed. Professional experience has shown that waste markets are flexible and adapt to changing markets within a region. It is expected that, whilst the actual waste facilities available may change over the course of the Wylfa Newydd Project, the overall capacity is likely to remain similar as the market responds.

6.4 Design basis and activities

6.4.1 This section sets out the design basis for this assessment of effects. It sets out where any assumptions have been made to enable the assessment to be carried out at this stage in the evolution of the design. This section also identifies the embedded and good practice mitigation that would be adopted to reduce adverse effects as inherent design features or by implementation of standard industry best working practice.

6.4.2 The elements of the Wylfa Newydd Project considered in this assessment that would generate waste are set out below:

- Power Station, Marine Works, and other on-site developments;
- Site Campus;
- Off-Site Power Station Facilities – the Alternative Emergency Control Centre (AECC), the Environmental Survey Laboratory (ESL) and the Mobile Emergency Equipment Garage (MEEG);
- Park and Ride;

- A5025 Off-line Highway Improvements; and
- Logistics Centre.

6.4.3 As described in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1), the application for development consent is based on a parameter approach. The assessment described within this chapter has taken into consideration the flexibility afforded by the parameters. A worst case scenario has therefore been assessed from a waste and materials perspective.

Construction

Basis of assessment and assumptions

6.4.4 Those construction activities of relevance to this assessment are as follows:

- demolition of existing buildings and walls;
- tree and hedgerow removal;
- clearance of other vegetation;
- species management;
- watercourse realignment;
- remediation activities;
- soil stripping, storage and reuse;
- bulk earthworks;
- deep excavation;
- excavation of other features such as culverts and building foundations;
- cooling water intake and outfall works;
- construction of the Marine Off-Loading Facility (MOLF);
- construction of the marine facilities;
- reuse and disposal of dredged material;
- construction of the breakwaters;
- creation of compounds;
- construction of the concrete batching plant and associated infrastructure;
- construction of perimeter fencing;
- construction of road crossings and haul roads; and
- construction of the following:
  - Off-Site Power Station Facilities;
  - Park and Ride;
  - A5025 Off-line Highway Improvements;
  - Site Campus; and

- Logistics Centre.

Embedded mitigation

6.4.5 As set out in the Design and Access Statement volume 2 (Power Station Site) (Application Reference Number: 8.2.2), the Power Station designs would incorporate modern, efficient design solutions. Wherever practicable, temporary buildings can be designed with a modular construction and would be manufactured off-site. Alternatively, other methods may be more efficient and will be considered in the round. If modular construction is appropriate, it will occur in controlled conditions to protect the integrity of the material from external elements. Construction within controlled conditions ensures:

- greater control of inventory of materials;
- greater potential to reuse materials; and
- materials are less likely to be damaged and improved recycling rates can be more easily achieved resulting in less waste.

6.4.6 In addition, and as set out in the Design and Access Statement, volume 2 and volume 3 (Associated Developments and Off-Site Power Station Facilities) (Application Reference Numbers: 8.2.2 and 8.2.3 respectively), modular buildings can be disassembled and relocated/refurbished with greater ease and efficiency, potentially reducing decommissioning waste.

Good practice mitigation

6.4.7 All construction would be carried out in line with the requirements set out in the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6) in line with Horizon's waste hierarchy which aligns with the Waste Framework Directive. In accordance with the Wylfa Newydd CoCP (Application Reference Number: 8.6), where practicable, local waste management facilities would be used taking into consideration the potential impact on local waste infrastructure capacity.

6.4.8 The good practice mitigation measures identified for the Wylfa Newydd Project are identified in table C6-2.

Table C6-2 Construction good practice mitigation measures

Good practice mitigation measures	Objective	Achievement criteria and reporting requirements
Implementation of waste management arrangements in accordance with the waste and materials management strategy set out in section 9 of the Wylfa Newydd	To help manage and reduce the amount of waste produced and therefore disposed of to landfill.	The Wylfa Newydd CoCP (Application Reference Number: 8.6) sets out waste reduction measures in line with the waste hierarchy. Horizon would fulfil the requirements of the Waste (England and Wales) Regulations 2011 (amended 2014) and the Environment (Wales) Act 2016 in applying

Good practice mitigation measures	Objective	Achievement criteria and reporting requirements
CoCP (Application Reference Number: 8.6).		the waste hierarchy and nearest appropriate installation principle, where reasonable in the circumstances, and to ensure that pre-treatment of waste is undertaken prior to disposal to landfill.
Implementation of materials management arrangements in accordance with the waste and materials management strategy set out in section 9 of the Wylfa Newydd CoCP (Application Reference Number: 8.6).	To set out a clear framework for the management of excavated materials, so that they can be reused as far as practicable on-site, thus reducing the need for off-site disposal.	Waste and materials to be managed in accordance with *The Definition of Waste: Development Industry Code of Practice* [RD4] and submitted for Qualified Person review.

Operation

Basis of assessment and assumptions

6.4.9 Waste generated by the activities associated with the operation of the Power Station Site and the Off-Site Power Station Facilities relevant to this assessment are as follows:

- packaging waste for goods entering the site, e.g. paper, card, glass, plastic and metal;
- office and administrative wastes;
- canteen waste from the kitchen and restaurant/café facilities;
- Waste Electrical and Electronic Equipment (WEEE), e.g., computers, cookers and fridges;
- switchgear and pumps;
- metal waste from maintenance works, garages;
- building maintenance waste, e.g. timber, plasterboard, insulation, paint tins and metals; and
- hazardous wastes, e.g. some chemicals, paints, fuel and oils.

6.4.10 In accordance with the waste management strategy within section 15 of the Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference

Number: 8.13) waste would be segregated at source thus increasing the potential for the amount of waste available for reuse and recycling, reducing the amount of waste requiring off-site disposal. Containers would be provided to suit the requirements of the Power Station Site and the Off-Site Power Station Facilities as set out in the Wylfa Newydd CoOP (Application Reference Number: 8.13). All waste would be removed from site by appropriately licensed contractors in accordance with the Waste Duty of Care and other applicable legislation and sent to recycling/treatment facilities as appropriate.

6.4.11 Occupants and site users would be made aware of their requirements and responsibilities with regards to managing operational waste through the Wylfa Newydd CoOP (Application Reference Number: 8.13).

Embedded mitigation

6.4.12 The inclusion of a dedicated waste and recycling facility forms an embedded mitigation measure. As set out in section 15 of the Wylfa Newydd CoOP (Application Reference Number: 8.13) all conventional wastes generated at the Power Station Site would be handled at the waste and recycling facility (Conventional & Hazardous Waste Building and Conventional Waste Storage Compound) which would be located on the Power Station Site.

6.4.13 The waste and recycling facility is designed solely for the storage, treatment and collection of conventional wastes from the facilities of the Power Station Site.

6.4.14 These waste and recycling facility would be a secure fenced facility that consists of managing waste in accordance with the following:

- waste would be received within a reception area;
- waste would be dismantled into individual waste types;
- hazardous and non-hazardous wastes would be segregated and stored in designated storage areas;
- recyclables would be segregated and stored in a separate area; and
- large containers and portable compactors would be stored in an external yard.

6.4.15 The facility would be designed to be compliant with and would operate in accordance with NRW's waste permit regime. The facility would have sealed drainage and waste would be suitably contained to prevent any spillages entering the drainage system. The design would also incorporate the industry guidance on fire prevention by providing suitable distances between wastes stored within the waste and recycling facility. It will also be designed to accommodate increasing levels of segregation, reuse and recycling. All skips would be weighed prior to transport in and out of the Power Station Site.

6.4.16 Horizon would retain conventional waste until it is removed from site by a licensed waste management contractor.

6.4.17 The designs for the Off-Site Power Station Facilities would include an external refuse area including provision for the storage and collection of recyclable and general waste. The area is proposed to be easily accessible to both building occupants and by waste management contractors to facilitate collection.

Good practice mitigation

6.4.18 All waste generated during the operation of the Power Station would be managed in accordance with the waste management strategy set out in the Wylfa Newydd CoOP (Application Reference Number: 8.13), the waste hierarchy and the nearest appropriate installation principle. The strategy sets out Horizon's framework for the management of waste and materials. The strategy provides the approach to waste and materials management across the lifetime of the Wylfa Newydd Project.

6.4.19 The waste and recycling facility would enable the safe segregation and storage of wastes in compliance with legislation prior to transferring the wastes to a suitable treatment route, in line with Horizon's waste hierarchy which aligns with the Waste Framework Directive in accordance with the Wylfa Newydd CoOP (Application Reference Number: 8.13). As with the approach followed for the construction phase, Horizon would fulfil the requirements of the Waste (England and Wales) Regulations 2011 (amended 2014) and the Environment (Wales) Act 2016 in applying the waste hierarchy and nearest appropriate installation principle, where reasonable in the circumstances, and to ensure that pre-treatment of waste is undertaken prior to disposal to landfill.

Decommissioning

Basis of assessment and assumptions

6.4.20 Decommissioning activities of relevance to the assessment for the Power Station and Off-Site Power Station Facilities are as follows:

- plant removal (from non-radioactive facilities);
- demolition of buildings and facilities;
- backfilling and grouting of buried structures;
- demolition of marine facilities; and
- site clearance.

6.4.21 It has been assumed that, once structures have been assessed to be radiologically clean, they would be released for demolition using conventional techniques. It is assumed that underground structures would be backfilled and site roads, utilities and any hardstanding removed. The majority of the Power Station and Off-Site Power Station Facilities (apart from those areas required for ongoing spent fuel and waste storage) would be restored to a condition to be agreed as part of an Environmental Impact Assessment and other regulatory submissions for the Decommissioning stage of the Project. The types and quantities of waste from the demolition

of buildings and facilities are estimated from the materials required for their construction.

6.4.22 After completion of construction of the Power Station and Off-Site Power Station Facilities, the Site Campus, Park and Ride and Logistics Centre would be decommissioned. For the Site Campus and Park and Ride, the buildings, utilities, site roads and hardstanding areas would be removed and the sites restored as stated in this Environmental Statement (see volume D, Application Reference Number: 6.4.1 to 6.4.16 and volume F, Application Reference Number: 6.6.1 to 6.6.12). For the Logistics Centre, the building and inspection structure, security scanner and security kiosk would be removed, but the parking areas, hard standing and site drainage infrastructure would be left in place for future users of the site. The types and quantities of waste from the demolition of buildings and facilities at the Site Campus, Park and Ride and Logistics Centre are estimated from the materials required for their construction

Embedded mitigation

6.4.23 The embedded mitigation measures detailed for the construction phase are also relevant during the decommissioning phase.

6.4.24 The modular design incorporated consideration of the decommissioning, the ease and efficiency of disassembling, relocation and refurbishment, potentially reducing decommissioning waste.

Good practice mitigation

6.4.25 All waste generated during the decommissioning of the Power Station would be managed in accordance with similar principles to those set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Wylfa Newydd CoOP (Application Reference Number: 8.13).

6.4.26 Waste management is a rapidly evolving discipline, and it is unclear what technological advancements might be made in the period from the start of operation to decommissioning. Future technologies would potentially allow for more efficient and sustainable methods of waste management.

6.4.27 An assessment on the capacities of the receiving waste management facilities to receive wastes during decommissioning would be made at the appropriate time. Prior to decommissioning, an assessment of the likely material types and quantities to be generated would be made and mitigation measures proposed based on this information at the time.

6.5 Assessment of effects

6.5.1 This section presents the findings of the project-wide assessment of effects for waste and materials.

6.5.2 For the purposes of this assessment, waste and materials include consideration of the following:

- the use and management of materials generated on-site that are considered as ‘non waste’, for example, rock, stone and soil excavated

from site that are reused within the Wylfa Newydd Project for haul roads, building platforms and landscaping that fall within Chapter I, Article 2(1)(c) of the Waste Framework Directive; and

- the generation and management of Conventional Wastes including hazardous, non-hazardous and inert waste.

6.5.3 Effects are primarily associated with the requirement to treat or process the different waste streams generated by the Wylfa Newydd Project at permitted off-site waste management facilities (including recycling, recovery or disposal facilities).

6.5.4 The overall assessment considers that waste management facilities are located on a regional level. Waste would be managed in accordance with *Technical Advice Note 21: Waste* [RD5] and the nearest appropriate installation principle. Although not part of the assessment, it is noted that there is limited local capacity available, and there is a risk that the waste produced by the Wylfa Newydd Project could affect existing local waste management facilities by using a significant proportion of the permitted capacity. Further details on the impact at a local level can be found in appendix C6-1 (Application Reference Number: 6.3.30).

6.5.5 It should be noted that any non-hazardous waste produced by the Wylfa Newydd Project requiring off-site disposal to landfill would need to be disposed of at a non-hazardous waste landfill site located in northwest England. There are also currently no hazardous waste landfills in north Wales. Therefore, any hazardous waste produced by the Wylfa Newydd Project requiring off-site disposal to landfill would also need to be disposed of at a hazardous waste landfill site located in northwest England.

Construction

Types, quantities and sources of waste and materials

6.5.6 For the purposes of this assessment, it is assumed that the Wylfa Newydd Project construction programme would commence after the granting of development consent. The construction programme is phased, with the first UK Advanced Boiling Water Reactor (ABWR) Unit expected to be operational in year 7, and the second UK ABWR Unit operational approximately two years later, in year 9.

6.5.7 The anticipated main types of waste likely to be generated during the construction of the Wylfa Newydd Project are inert and non-hazardous wastes, including timber, packaging, and mixed construction and demolition wastes. Most of the waste generated from the Wylfa Newydd Project would be offcuts from fitting materials, packaging and spent material from the construction activities.

6.5.8 Estimates of waste arisings associated with the site clearance activities at the Wylfa Newydd Development Area to prepare the Power Station Site have been calculated based on information contained within [RD6]. The information within this document was gathered from surveys undertaken at the site and measurements of those elements and features that require

removal as part of the construction. Estimates of waste and materials arisings from the demolition of the buildings on-site have been calculated based on information contained within [RD7]. Each waste type was converted from the original unit of measure (for example, the length of dry stone walls or the number of gates to be removed) from on-site surveys into a consistent base unit appropriate for waste. As waste volumes are generally measured by mass, each waste type has been converted into tonnes using bulk densities. This enables a consistent comparison with the capacity of waste facilities. In order to make this conversion, assumptions have been made regarding the properties or nature of these wastes and materials using information from designers and professional judgement.

6.5.9 A forecast of waste tonnages from the construction activities associated with the Wylfa Newydd Project have been undertaken using Building Research Establishment key performance indicators for the development of residential properties assuming a 'good practice' level of waste arising. Incorporated within this forecast is additional waste arisings for activities and developments that are specific to the Park and Ride, Logistics Centre, Off-Site Power Station Facilities and A5025 Off-line Highway Improvements. Site specific measurements for site clearance activities similar to those at the Wylfa Newydd Development Area are not available. However, the Building Research Establishment key performance indicators include waste arisings from site clearance, and this is therefore included in the forecast waste tonnages for the Park and Ride, Logistics Centre, Off-Site Power Station Facilities and A5025 Off-line Highway Improvements.

6.5.10 The operational Park and Ride waste has been calculated based on the assumption that there would be 1,900 parking spaces, with each car parking space generating approximately 2.2kg of waste a year. To account for the shift patterns of construction workers, an occupancy of 150% for each car parking space over a 24-hour period has been assumed. This is based on information that has been obtained from discussions with an existing park and ride. The same assumption for the waste per year is used for the waste generated from lorry drivers parking at the Logistics Centre. The waste generated from the Site Campus (including workers and residents) is based on the average amount of household waste generated per person per year of 403kg [RD8].

6.5.11 Additionally, a contingency of 20% has been added to the waste estimates, and the tonnages have been rounded to ensure that, for the purposes of this assessment, the quantification of all waste and materials has been based on a worst case scenario. The aims and targets of *One Wales: One Planet – The Sustainable Development Scheme of the Welsh Assembly Government* [RD9] have been considered in this assessment. The goal of One Wales: One Planet is to achieve 70% recycling across all sectors by 2025. Waste generated by the Wylfa Newydd Project would be managed in accordance with the waste hierarchy and therefore recycled and recovered wherever practicable, thus contributing to the 70% recycling target. Professional judgement is used to allocate the most appropriate management method for the waste generated based on the waste hierarchy to determine the most reasonably practicable management method, minimising the amount

produced and recovering the maximum value from all wastes. For example, if a material can be reused within the Wylfa Newydd Project, this would be considered the most appropriate management method; if this is not practicable, the next most appropriate method would be considered. Disposal to landfill is considered as the last resort for any wastes other than those for which landfill is mandatory, such as asbestos. For the purposes of this assessment, the worst case for some waste is considered to be landfill. However, it is anticipated that some of this waste could be managed higher up the waste hierarchy through energy from waste recovery, if this management option was to be available. For the purposes of this assessment it has been assumed that the only option available for hazardous waste is the disposal at a third party off-site facility.

6.5.12 The anticipated main types and total quantities of waste generated during construction of the Wylfa Newydd Project are shown in table C6-3. The surveys reported in [RD7] identified 300 tonnes of asbestos, 50 tonnes of which was from construction & demolition activities and 250 tonnes from asbestos separated on-site from contaminated soils. These tonnages are included with the hazardous category in table C6-3.

6.5.13 Table C6-3 describes the intended management method for the waste streams. It is likely that some of the waste detailed in table C6-3 would require segregation and storage on-site in satellite and storage compounds until it was transferred off-site for reuse, recycling, treatment or disposal.

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Table C6-3 Summary of waste arisings generated from the construction phase

Waste arisings	Waste category	Total quantity produced – tonnes (including 20% contingency)						Total (tonnes)	Intended management method
		Power Station	Site Campus	Off-Site Power Station Facilities	Park and Ride	Logistics Centre	A5025 Off-line Highway Improvements		
Mixed construction and demolition	Non-hazardous	17,750	7,270	110	20	50	45	25,245	Recycled/disposal at a third party off-site treatment facility
Other	Non-hazardous	25,530	550	40	5	5	485	26,615	Reused within the Wylfa Newydd Project, reused by a third party off-site, or recycled or composted at a third party off-site treatment facility
Inert	Inert	49,220	9,200	550	610	310	35,625	95,515	Reused within the Wylfa Newydd Project
Concrete	Inert	7,260	3,200	50	10	20	390	10,930	
Bricks	Inert	8,800	1,720	20	5	10	-	10,555	
Tiles	Inert	400	160	5	1	1	-	567	
Timber	Non-hazardous	6,075	2,630	40	10	20	30	8,805	Reuse by third party off-site or recycled at a third party off-site treatment facility
Packaging	Non-hazardous	1,760	780	10	5	5	15	2,575	
Plasterboard	Non-hazardous	1,640	750	10	5	5	-	2,410	Recycled/disposal at a third party off-site treatment facility
Plastic	Non-	1,050	460	10	5	5	1	1,531	Reuse by third party

Waste arisings	Waste category	Total quantity produced – tonnes (including 20% contingency)						Total (tonnes)	Intended management method
		Power Station	Site Campus	Off-Site Power Station Facilities	Park and Ride	Logistics Centre	A5025 Off-line Highway Improvements		
	hazardous								off-site or recycled at a third party off-site treatment facility
Mixed metals	Non-hazardous	700	300	70	1	5	10	1,086	
Canteen	Non-hazardous	500	220	5	1	1	35	762	Anaerobic digestion/in-vessel composting at a third party off-site treatment facility
Insulation	Non-hazardous	220	100	1	1	1	-	323	Recycled/disposal at a third party off-site treatment facility
Binders	Non-hazardous	135	60	1	1	1	-	198	
Flooring	Non-hazardous	40	20	1	1	1	-	63	Reuse by a third party off-site or recycled at a third party off-site treatment facility
WEEE	Non-hazardous	30	10	1	1	-	5	47	
Liquids	Non-hazardous	30	20	1	1	1	-	53	Recycled/composted/ disposal at a third party off-site treatment facility
Furniture	Non-hazardous	5	5	1	1	1	-	13	Reuse by a third party off-site or recycled at a third party off-site treatment facility

Waste arisings	Waste category	Total quantity produced – tonnes (including 20% contingency)						Total (tonnes)	Intended management method
		Power Station	Site Campus	Off-Site Power Station Facilities	Park and Ride	Logistics Centre	A5025 Off-line Highway Improvements		
Hazardous (including asbestos)	Hazardous	1,520	220	30	1	5	-	1,776	Hazardous disposal at a third party off-site facility
Bituminous	Hazardous	560	250	5	1	1	8,465	9,282	
Oils	Hazardous	5	5	1	1	1	1	14	
Construction waste remaining on-site		83,020	14,280	625	626	341	36,015	134,907	
Construction waste taken off-site		40,210	13,650	337	61	108	9,092	63,458	
Total construction wastes		123,230	27,930	962	687	449	45,107	198,365	
Tonnages greater than 1 are rounded to the nearest 5 tonnes; tonnages less than 1 are rounded up to 1 tonne. The totals sum the tonnages within the table and are not rounded.									

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6.5.14 The Site Campus, Logistics Centre and Park and Ride would be operational to support the construction phase of the Power Station. The types of waste that would be generated would include packaging, e.g. paper, card, glass, plastic and metal; office and administrative waste; and canteen waste from the kitchen and restaurant/café facilities. Table C6-4 presents the estimated waste generated per annum from the operation of these facilities.

Table C6-4 Summary of waste arisings generated from the operation of the Logistics Centre, Park and Ride, and Site Campus during construction phase

Waste arisings	Waste category	Total quantity produced – tonnes per annum (including 20% contingency)			Total (tonnes)	Intended management method
		Site Campus	Park and Ride	Logistics Centre		
Other non-hazardous (tyres, waste printing toner, etc.)	Non-hazardous	1,010	1	1	1,012	Recycled/composted/disposal at a third party off-site treatment facility
WEEE	Non-hazardous/ hazardous	50	-	1	51	
Paper and card	Non-hazardous	370	5	5	380	Recycled at a third party off-site treatment facility
Plastic packaging	Non-hazardous	220	1	1	222	
Mixed metals (from maintenance activities)	Non-hazardous	80	1	5	86	
Wooden packaging	Non-hazardous	-	-	5	5	
Biodegradable food waste	Non-hazardous	340	5	5	350	Anaerobic digestion/in-vessel composting at a third party off-site treatment facility
Hazardous waste	Hazardous	10	-	1	11	Hazardous disposal at a third party off-site facility
Oily water (hazardous)	Hazardous	-	-	5	5	
Total operational waste		2,080	10	29	2,119	
Tonnages greater than 1 are rounded to the nearest 5 tonnes, tonnages less than 1 are rounded up to 1 tonne. The totals sum the tonnages within the table and are not rounded.						

6.5.15 Table C6-5 provides a summary of the quantities of construction inert, non-hazardous and hazardous waste that would either be reused on-site or taken off-site for reuse, recycling, treatment and/or disposal. This includes the operational waste generated by the Site Campus, Logistics Centre and Park and Ride during the construction phase. The operational waste annual tonnages presented in table C6-4 are multiplied by the number of years the sites would be operational for during the construction phase and included in table C6-5. This is assumed to be 6.5 years of full operation for the Logistics Centre and Park and Ride, and as a result of the phased development of the Site Campus, it is assumed it would accommodate 2,000 workers for four years and 4,000 workers for a further four years.

Table C6-5 Summary of waste arisings generated from the construction phase

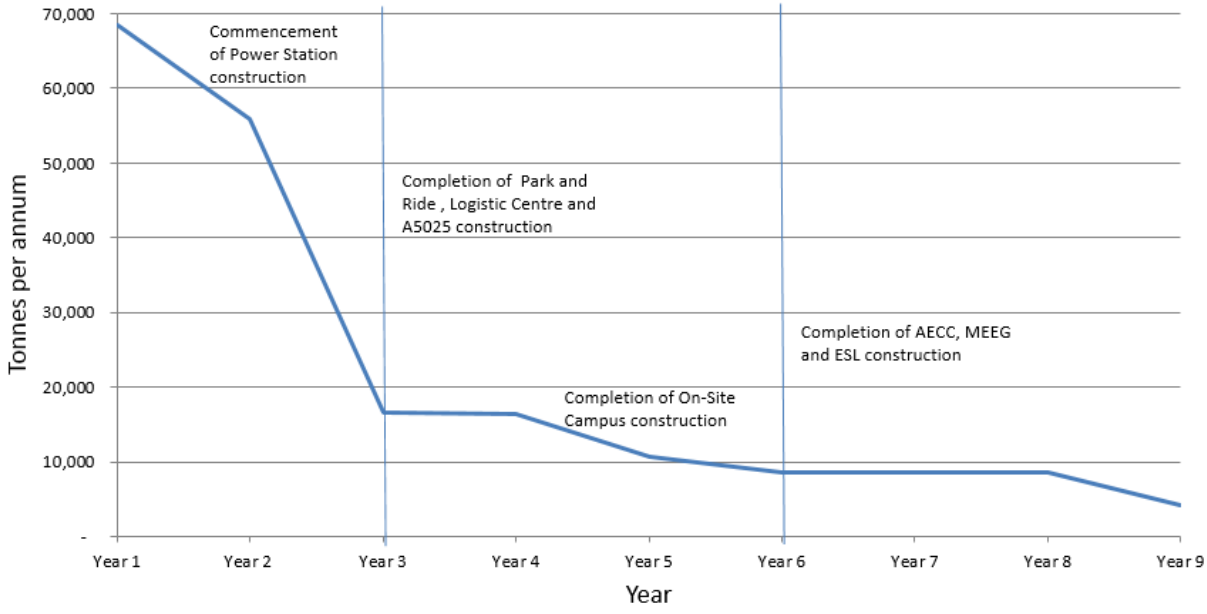
Management method	Inert	Non-hazardous	Hazardous	Total
	Tonnes			
Reused within the Wylfa Newydd Project	117,580	17,345	-	134,925
Composted at a third party off-site treatment facility	-	6,700	-	6,700
Anaerobic digestion/in-vessel composting at a third party off-site treatment facility	-	2,620	-	2,620
Reuse by third parties or recycled at a third party off-site treatment facility	-	49,140	-	49,140
Non-hazardous disposal at a third party off-site facility	-	6,490	-	6,490
Hazardous disposal at a third party off-site facility	-	-	11,150	11,150
Total	117,580	82,290	11,150	211,020
* where appropriate, tonnages have been rounded in the tables and may lead to small discrepancies				

6.5.16 The total construction waste forecast to be generated from the Wylfa Newydd Project is approximately 211,020 tonnes over the whole construction period, which is anticipated to last nine years. It is estimated that a peak in waste exports from the Wylfa Newydd Project would occur in year 1, with the commencement of the construction of the Power Station. The waste volumes would decrease with completion of the Park and Ride, Logistics Centre and A5025 Off-line Highway Improvements before year 3. It is estimated that the construction of the Site Campus and Off-Site Power Station Facilities would be completed in the end of year 5, resulting in a further reduction in waste volumes. The waste generation volumes then

remain relatively constant until the completion of the construction of the Power Station early in year 9 when the volumes reduce to the operational waste volumes.

6.5.17 The estimated total combined waste tonnage generated from the construction of each of the elements of the Wylfa Newydd Project is illustrated in figure C6-1 below. It should be noted that, while the construction programme for each element is considered, the assessment assumes that waste tonnages are generated evenly over each year of the construction period of each element. While figure C6-1 estimates the arisings over time, the exact timing of when the waste would be generated is not currently known. Therefore, for the purposes of the assessment, this distribution is not used, and it has been assumed that waste would be generated over one year as a conservative basis to assess potential effects. Professional judgement has been used to ensure that the assessment is based on a worst case, as explained where relevant in the following assessment sections.

Figure C6-1 Estimated waste tonnages generated from the construction of the Wylfa Newydd Project



6.5.18 Although not included in table C6-5, materials arisings would also include soils and rock from bulk earthworks, deep excavations and tunnelling, topsoil strip and dredging spoil.

6.5.19 Earthworks activities would generate in the region of 9,000,000m^3 of excavated materials. A proportion of this would be used to create the construction compounds and haul roads, and some would be used when creating the Power Station building platform. The remainder would be used within the Wylfa Newydd Development Area to create an appropriate

landscape setting for the Power Station and help to mitigate potential noise and visual effects.

6.5.20 It is estimated that approximately 600,000m^3 of topsoil would be generated from the Wylfa Newydd Development Area. Topsoil would be reused within landscape mounds. It is anticipated that soil would be stripped progressively as the works progress and placed back wherever practicable in the same general location from where it was stripped.

6.5.21 Soft sediment and rock will be dredged during the Marine Works in the outer harbour. Dredged rock arising from the works would be re-used to construct the marine facilities (e.g. for core material in the breakwaters), where practicable, and any excess rock and soft sediment would be disposed of at the Disposal Site. The management and disposal of marine dredging is discussed in chapter D13 (Application Reference Number: 6.4.13).

6.5.22 It is anticipated that silt generated from the drainage system would be reused on the Wylfa Newydd Project, where it is suitable for use. Where it is not suitable for use on-site, the silt would be taken off-site to an appropriate licensed facility. Currently the volume of silt to be generated is not known.

6.5.23 Table C6-6 provides a summary of the cut and fill quantities generated through the construction of the Site Campus, Park and Ride, Logistics Centre, Off-Site Power Station Facilities and the A5025 Off-line Highway Improvements.

Table C6-6 Summary of cut and fill quantities generated through the construction phase

	Volume of cut (m3) (including topsoil strip)	Volume of fill (m3) (including topsoil reuse)
Site Campus	49,190	17,480
Park and Ride	37,649	65,584
Logistics Centre	26,865	8,825
Off-Site Power Station Facilities	8,670	2,975
A5025 Off-line Highway Improvements	111,250	113,500

6.5.24 The amount of cut and fill would be managed at all sites to reduce the amount of material removed from site. For example, at the Park and Ride minimal subbase is proposed below permeable paving which would reduce the cut required. It is anticipated that all excavated material and topsoil generated from the construction of the Power Station, Site Campus, Park and Ride, Logistics Centre, Off-Site Power Station Facilities and the A5025 Off-line Highway Improvements would be reused within the Wylfa Newydd Project.

6.5.25 The potential effects on the waste management facilities from waste and materials generated during construction activities is summarised below. As noted in the methodology, Chapter B16 (waste and materials management) (Application Reference Number: 6.2.16), professional judgement has been used in relation to specific circumstances and anticipated impacts and

effects for individual receptors. Some variation is evident in the attributed level of significance of effect. In the context of the construction impacts, professional judgement is required to determine whether the effects are significant based on the evidence presented.

On-site reuse of waste and materials

6.5.26 During construction, it is anticipated that the recovered waste from above-ground features, including dry stone, retaining and concrete/brick walls, would remain on-site and be taken to the material storage compound before eventual reuse on-site.

6.5.27 Japanese knotweed and other Invasive Non-Native Species have been identified as being present on-site and would be treated and managed on-site within the Remediation Processing Compound in accordance with the *Guidance for the Control of Invasive Species including Japanese knotweed* [RD10] which provides guidance on the safe disposal of Japanese knotweed and other Invasive Non-Native Species.

6.5.28 It is also anticipated that materials including rock and superficial deposits would be retained on-site and reused wherever practicable for landscaping, engineering embankments, backfill around any classified structures, subbase, marine fill and concrete aggregates. Soil would be stripped and stockpiled for subsequent reuse in accordance with appropriate management measures and treatment, such as restrictions on stockpile heights. This significantly reduces the amount of material to be classified as waste, which would subsequently be required to be removed off-site for reuse, recycling, recovery or disposal. As these wastes and materials would be reused on-site, the sensitivity of these resources is considered to be negligible.

6.5.29 The magnitude of change is considered to be negligible, as no off-site waste management infrastructure would be required to handle these materials. Therefore, the overall effect of these materials on the receiving waste management sites is considered to be negligible.

Off-site composting of waste

6.5.30 It is anticipated that, from the clearance of agricultural land including the removal of hedgerows and trees, some of the wood generated would be chipped on-site and reused, and the remaining vegetation waste would be removed off-site for composting or to a biomass facility for recovery. Therefore, as the majority of green waste would be taken off-site for composting, the assessment considers the sensitivity to be low. It should be noted that this waste would be generated at the beginning of the construction period. In 2016, the annual capacity of composting facilities in north Wales was 168,996 tonnes per annum. It is estimated that the construction activities would generate approximately 6,700 tonnes of green waste that could be taken off-site for composting.

6.5.31 Assuming all the green waste was produced over one year, this is less than 4% of the permitted capacity in north Wales. Therefore, the magnitude of change is considered to be small.

6.5.32 As the waste would be composted, the sensitivity is low and the magnitude is small. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Off-site anaerobic digestion and in-vessel composting of waste

6.5.33 Canteen type waste would be produced by the construction works and the Site Campus during the nine-year construction period. It has been assumed that 70% of this waste would be food waste sent for recovery using anaerobic digestion. Therefore, as the majority of canteen waste would be taken off-site for anaerobic digestion and/or in-vessel composting, the assessment considers the sensitivity to be low.

6.5.34 In 2016, the annual capacity of anaerobic digestion facilities in north Wales was 86,499 tonnes per annum. It is estimated that construction would generate approximately 2,620 tonnes of food waste that could be taken off-site for anaerobic digestion and/or in-vessel composting. Assuming the worst case, that all the food waste was produced over one year, this is between 1% and 5% of the permitted capacity in north Wales. Therefore, the magnitude of change is considered to be small.

6.5.35 The sensitivity is low and the magnitude is small; therefore, the potential effect on the receiving waste management facilities is considered to be minor.

6.5.36 It should be noted that this waste generated from the construction of the Wylfa Newydd Project would be spread over a period of approximately eight years, rather than condensed into one year. It is therefore expected that the waste management infrastructure within north Wales would be capable of managing the waste and that the effect would be negligible.

Off-site reuse and recycling of waste

6.5.37 The majority of the waste generated on-site, including metals, packaging, timber, plastics, road signs, lamp posts, gates, fencing and mixed construction and demolition waste, would be taken off-site for recycling. While these wastes would predominantly be reused or recycled off-site, a small proportion of waste may be recovered or disposed of.

6.5.38 Construction workers would themselves generate ‘general’ wastes (such as packaging waste, food waste, paper, cans, glass and plastic bottles) in small volumes. It is assumed that 70% of this material would be recycled off-site, consistent with the Welsh Government’s target of 70% recycling by 2025 [RD7]. Therefore, as the wastes are predominantly reused or recycled off-site, the sensitivity is considered to be low.

6.5.39 In 2016, the capacity for reuse and recycling in north Wales was 374,999 tonnes. It is estimated that the Wylfa Newydd Project would produce approximately 49,140 tonnes of waste that could be recycled during the eight-year construction period. Assuming the worst case, that this is generated in one year, this would be approximately 13% of the reuse and recycling capacity in north Wales. Therefore, the magnitude of change is considered to be large.

6.5.40 The assessment considers the sensitivity to be low and the magnitude to be large. Therefore, the potential effect on the receiving waste management facilities is considered to be moderate.

6.5.41 However, in view that the total waste generated from the construction of the Wylfa Newydd Project would be spread over a construction period of approximately eight years, it is expected that the waste management infrastructure within north Wales would be capable of managing the waste over this period of time without having an adverse effect on capacity. The magnitude of change can therefore be reduced to small. Thus, the overall effect on the receiving waste management facilities can be considered to be minor.

Off-site disposal of non-hazardous waste

6.5.42 It is likely that any construction wastes that could not be reused or recycled would require disposal off-site to a non-hazardous landfill. The majority of waste generated by the construction workers would be taken off-site for recycling. However, it is assumed that the remaining 30% could not be recycled and would require disposal off-site. It is likely that this waste would be disposed of to a non-hazardous landfill. Therefore, as the waste would be disposed of to landfill, the sensitivity is considered to be high.

6.5.43 In 2016, permitted non-hazardous waste landfill capacity in northwest England was approximately 39,335,000m^3. It is estimated that the Wylfa Newydd Project would produce approximately 9,830m^3 of non-hazardous waste during construction. To calculate the volume of non-hazardous waste, it is assumed that the 6,490 tonnes has a bulk density of 0.66 tonnes per m^3. This is less than 1% of the annual non-hazardous waste landfill capacity in northwest England; thus, the magnitude of change is considered to be negligible. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Off-site disposal of hazardous waste

6.5.44 Hazardous waste generated through the construction of the Wylfa Newydd Project is likely to be disposed of to a hazardous waste landfill in the worst case. The construction phase would generate asbestos waste and associated soils, which would be classified as hazardous waste. Asbestos from building demolition and asbestos separated on-site from contaminated soils would be treated as hazardous waste, removed from site and disposed of in suitably permitted facilities. The removal of the electricity and telecom poles would generate very small quantities of wood waste, and this material may be classified as hazardous due to the treatments applied to the wood. Removal of tanks would generate very small volumes of metal and concrete waste and, given the content of the tanks is largely unknown, this material may be classified as hazardous. It is also anticipated that non-asbestos-related contaminated soils would be removed from site (from the removal of the trichloroethene sump and hydrocarbon hotspot). Therefore, as the waste would be disposed of to landfill, the sensitivity of the waste is considered to be high.

6.5.45 It should be noted that the assessment assumes that hazardous waste would be handled in northwest England, as there are no suitable hazardous waste landfill sites in north Wales. Hazardous waste produced during the construction would be less than 1% of the annual hazardous landfill capacity in northwest England. In 2016, permitted hazardous waste landfill capacity in northwest England was approximately 6,481,000m^3. It is estimated that the Wylfa Newydd Project would produce approximately 16,895m^3 of hazardous waste during construction. To calculate the volume of hazardous waste, it is assumed that the 11,150 tonnes has a bulk density of 0.66 tonnes per m^3. This is less than 1% of the annual hazardous waste landfill capacity in northwest England. Thus, the magnitude of change is considered to be negligible. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Operation

Types, quantities and sources of waste

6.5.46 The Power Station is anticipated to be in operation for 60 years, and it is likely that waste would be generated continually throughout this period. Conventional wastes generated during the day-to-day operation of the Power Station and Off-Site Power Station Facilities would lead to the generation of the following types of conventional waste:

- packaging for goods entering the site, e.g. paper, card, glass, plastic and metal;
- office and administrative wastes;
- canteen waste from the kitchen and restaurant/café facilities;
- WEEE, e.g. computers, cookers and fridges;
- switchgear and pumps;
- metal waste from maintenance works and garages;
- building maintenance waste, e.g. timber, plasterboard, insulation, paint tins and metals; and
- hazardous wastes, e.g. some chemicals, paints, fuel and oils.

6.5.47 Operational waste would be generated from the Off-Site Power Station Facilities during the 60-year operational period of the Power Station.

6.5.48 A forecast of waste from the operational activities associated with the Power Station and Off-Site Power Station Facilities has been estimated. The quantity of operational waste from the Power Station and the Off-Site Power Station Facilities assumes 1.1 tonnes per employee per year [RD11]. For the AECC and MEEG which will only be used during training exercises and emergencies, it is assumed that they would be operational for 60 days per year.

For the purposes of this assessment, the quantification of waste has been based on a worst case scenario. Additionally, a contingency of 20% has been added to the waste estimates. The anticipated main types and annual quantities of waste generated during operation are shown in table C6-7.

Table C6-7 Summary of wastes arisings during the operational phase

Waste arisings	Waste category	Total quantity produced – tonnes per annum (including 20% contingency)		Total (tonnes)	Intended management method
		Power Station Site	Off-Site Power Station Facilities		
Mixed metals (from maintenance activities)	Non-hazardous	320	5	325	Recycled at a third party off-site treatment facility
Wooden packaging	Non-hazardous	180	1	181	
Biodegradable food waste	Non-hazardous	170	1	171	Anaerobic digestion/in-vessel composting at a third party off-site treatment facility
Paper and card	Non-hazardous	150	1	151	Recycled at a third party off-site treatment facility
WEEE	Non-hazardous/hazardous	10	1	11	Recycled/disposal at a third party off-site treatment facility
Other non-hazardous (tyres, waste printing toner, etc.)	Non-hazardous	10	1	11	
Plastic packaging	Non-hazardous	1	1	2	Recycled at a third party off-site treatment facility
Oily water (hazardous)	Hazardous	190	5	195	Hazardous disposal at a third party off-site facility
Hazardous waste	Hazardous	60	1	61	

Waste arisings	Waste category	Total quantity produced – tonnes per annum (including 20% contingency)		Total (tonnes)	Intended management method
		Power Station Site	Off-Site Power Station Facilities		
Total operational waste		1,091	17	1,108	
Tonnages greater than 1 are rounded to the nearest 5 tonnes; tonnages less than 1 are rounded up to 1 tonne. The totals sum the tonnages within the table and are not rounded.					

6.5.49 Table C6-8 provides a summary of the quantities of the operational non-hazardous and hazardous waste generated through the operational phase and the intended management method.

Table C6-8 Summary of waste arisings generated during the operational phase

Management method	Non-hazardous	Hazardous	Total
	Tonnes per annum		
Recycled at a third party off-site treatment facility	660	-	660
Anaerobic digestion/in-vessel composting at a third party off-site treatment facility	170	-	170
Non-hazardous disposal at a third party off-site facility	15	-	15
Hazardous disposal at a third party off-site facility	-	255	255
Total	845	255	1,100
* where appropriate, tonnages have been rounded in the tables and may lead to small discrepancies			

6.5.50 The effects to the waste management facilities from waste generated during operation are summarised below.

Off-site recycling of waste

6.5.51 Wastes, including metals, plastic, paper and card, generated through the operational phase would predominantly be recycled off-site. A small proportion of waste may be recovered or disposed of. Therefore, since the waste would be predominantly reused or recycled off-site, the sensitivity of the waste is considered to be low.

6.5.52 In 2016, the annual capacity of recycling facilities in north Wales was 374,999 tonnes per annum. It is estimated that the operational phase would produce approximately 660 tonnes of waste over the 60-year operational period that could be recycled. This would be less than 1% of the annual capacity in north Wales. Therefore, the magnitude of change is considered to be negligible.

6.5.53 The assessment considers the sensitivity to be low and the magnitude to be negligible; therefore, the overall effect on the receiving waste management facilities is considered to be negligible.

Off-site anaerobic digestion and in-vessel composting of waste

6.5.54 Canteen type waste would be produced by operational staff, users of the Power Station Site and Off-Site Power Station Facilities. It has been assumed that 70% of this waste would be food waste sent for recovery using anaerobic digestion and/or in-vessel composting. Therefore, as the majority

of canteen waste would be taken off-site for anaerobic digestion and/or in-vessel composting, the assessment considers the sensitivity to be low.

6.5.55 In 2016, the annual capacity of anaerobic digestion and in-vessel composting facilities in north Wales was 86,499 tonnes per annum. It is estimated that, during the operational phase, approximately 170 tonnes of food waste would be generated that could be taken off-site for anaerobic digestion. Assuming all the food waste was produced over one year, this is less than 1% of the permitted capacity in north Wales. Therefore, the magnitude change is considered to be negligible.

6.5.56 The assessment considers the sensitivity to be low and the magnitude to be negligible; therefore, the overall effect on the receiving waste management facilities is considered to be negligible.

Off-site disposal of non-hazardous waste

6.5.57 A small proportion of the non-hazardous waste anticipated to be generated from the operational phase of the Wylfa Newydd Project could not be recycled and thus would require disposal off-site. It is likely that this waste would be disposed of to a non-hazardous landfill in the worst case. Therefore, as the waste would be disposed of to landfill, the sensitivity is considered to be high.

6.5.58 In 2016, permitted non-hazardous waste landfill capacity in northwest England was approximately 39,335,000m^3. It is estimated that the Wylfa Newydd Project would produce approximately 25m^3 of non-hazardous waste during the operational phase. To calculate the volume of non-hazardous waste it is assumed that the 15 tonnes has a bulk density of 0.66 tonnes per m^3. This is less than 1% of the annual non-hazardous waste landfill capacity in northwest England. Thus, the magnitude of change is considered to be negligible.

6.5.59 The assessment considers the sensitivity to be high and the magnitude to be negligible. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Off-site disposal of hazardous waste

6.5.60 Hazardous waste generated through the operational phase, such as contaminated waste, absorbents and filter materials, is likely to be disposed of to a hazardous landfill in the worst case. Therefore, the sensitivity is considered to be high.

6.5.61 It should be noted that the assessment assumes that hazardous waste would be handled in northwest England, as there are no suitable hazardous waste landfill sites in north Wales. In 2016, permitted hazardous waste landfill capacity in northwest England was approximately 6,481,000m^3. It is estimated that the operational phase of the Wylfa Newydd Project would produce approximately 385m^3 of hazardous waste during operation. To calculate the volume of hazardous waste, it is assumed that the 255 tonnes has a bulk density of 0.66 tonnes per m^3. This is less than 1% of the annual

hazardous waste landfill capacity in northwest England. Thus, the magnitude of change is considered to be negligible.

6.5.62 The assessment considers the sensitivity to be high and the magnitude to be negligible. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Decommissioning

Decommissioning of Site Campus, Park and Ride and Logistics Centre

Types, quantities and sources of waste

6.5.63 For the purposes of this assessment, the quantification of waste has been based on a worst case scenario. It is therefore assumed that decommissioning of Site Campus, Park and Ride and Logistics Centre would take place at the same time and be completed over one year. For the Site Campus and Park and Ride it is assumed that all materials used for construction would be removed from the sites for reuse, recycling or disposal. For the Logistics Centre, it is assumed that the building and inspection structure, security scanner and security kiosk that are on-site would be decommissioned, with the waste removed from the site. However, the parking areas, hard standing and site drainage infrastructure would be left in place on the Logistics Centre site for future users of the site. The anticipated main types and annual quantities of waste and materials generated during the decommissioning of the Site Campus, Park and Ride and Logistics Centre are shown in table C6-9.

6.5.64 At both the Site Campus and Park and Ride, there would be significant parking and road areas that would be decommissioned. It has been assumed that 95% of the planings from these areas would be reused/recycled, with the remaining 5% requiring hazardous disposal. This is in accordance with the Environment Agency Regulatory Position Statement 075 [RD12] that has been adopted by NRW and would apply for the movement and reuse/recycling of the road planings produced during the decommissioning phase.

Table C6-9 Summary of waste arisings during the decommissioning phase of the Site Campus, Park and Ride and Logistics Centre

Waste arisings	Waste category	Total quantity produced - tonnes			Total (tonnes)	Intended management method
		Site Campus	Park and Ride	Logistics Centre		
Aggregates and stones (from roads and parking areas)	Inert	25,600	52,445	-	78,045	Reuse/ recycled at a third party off-site inert treatment facility
Concrete	Inert	13,510	1,770	340	15,620	

Waste arisings	Waste category	Total quantity produced - tonnes			Total (tonnes)	Intended management method
		Site Campus	Park and Ride	Logistics Centre		
Rubble, hardcore, bricks and blockwork	Inert	9,270	1,215	235	10,720	
Tiles and ceramics	Inert	120	15	5	140	
Metals	Non-hazardous	22,900	3,000	580	26,480	Recycled at a third party off-site treatment facility
Timber	Non-hazardous	450	60	10	520	
Glass	Non-hazardous	40	5	1	46	
Gypsum (plasterboard)	Non-hazardous	750	100	20	870	Disposal at a third party off-site treatment facility
Planings, asphalt and bitumen binder (from roads and parking areas)*	Inert	9,595	19,665	-	29,260	Recycled at a third party off-site inert treatment facility
Planings, asphalt and bitumen binder (from roads and parking areas)*	Hazardous	505	1,035	-	1,540	Hazardous disposal at a third party off-site facility
Total decommissioning waste		82,740	79,310	1,191	163,241	

*It is assumed that 95% of the planings would be recycled, with the remaining 5% requiring hazardous disposal.

Tonnages greater than 1 are rounded to the nearest 5 tonnes; tonnages less than 1 are rounded up to 1 tonnes. The totals sum the tonnages within the table and are not rounded.

6.5.65 Table C6-10 provides the intended management method for the inert, non-hazardous and hazardous waste generated through the decommissioning phase of the Site Campus, Park and Ride and Logistics Centre.

Table C6-10 Summary of waste arisings during the decommissioning phase of the Site Campus, Park and Ride and Logistics Centre

Management method	Inert	Non-hazardous	Hazardous	Total
	Tonnes			
Reused/recycled at a third party off-site inert treatment facility	133,785		-	133,785
Reused/recycled at a third party off-site treatment facility	-	27,045	-	27,045
Non-hazardous disposal at a third party off-site facility	-	870	-	870
Hazardous disposal at a third party off-site facility	-	-	1,540	1,540
Total	133,783	27,915	1,540	163,240
* where appropriate, tonnages have been rounded in the table and may lead to small discrepancies				

Off-site reuse/recycling of inert waste

6.5.66 Wastes including aggregates, concrete and rubble generated through the decommissioning phase of the Site Campus, Park and Ride and Logistics Centre would predominantly be reused/recycled off-site. Therefore, since the waste would be predominantly reused or recycled off-site, the sensitivity of the waste is considered to be low.

6.5.67 In 2016, the annual capacity of sites that could use/treat inert waste for land reclamation or construction in north Wales was 1,541,491 tonnes per annum. It is estimated that the decommissioning of the Site Campus, Park and Ride and Logistics Centre would produce approximately 133,785 tonnes of waste which could be reused/recycled. This would be between 5% and less than 10% of the permitted capacity in north Wales. Therefore, the magnitude of change is considered to be medium.

6.5.68 The assessment considers the sensitivity to be low and the magnitude to be medium; therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Off-site recycling of waste

6.5.69 Wastes including metal, timber and glass generated through the decommissioning phase of the Site Campus, Park and Ride and Logistics Centre would predominantly be recycled off-site. Therefore, since the waste

would be predominantly recycled off-site, the sensitivity of the waste is considered to be low.

6.5.70 In 2016, the annual capacity of recycling facilities in north Wales was 374,999 tonnes per annum. It is estimated that the decommissioning of the Site Campus, Park and Ride and Logistics Centre would produce approximately 27,045 tonnes of waste which could be recycled. This would be between 5% and 10% of the permitted capacity in north Wales. Therefore, the magnitude of change is considered to be medium.

6.5.71 The assessment considers the sensitivity to be low and the magnitude to be medium. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Off-site disposal of non-hazardous waste

6.5.72 Non-hazardous waste generated from the decommissioning phase of the Site Campus, Park and Ride and Logistics Centre that could not be recycled would require disposal off-site. It is likely that this waste would be disposed of to a non-hazardous landfill in the worst case. Therefore, as the waste would be disposed of to landfill, the sensitivity is considered to be high.

6.5.73 In 2016, permitted non-hazardous waste landfill capacity in northwest England was approximately 39,335,000m^3. It is estimated that the Wylfa Newydd Project would produce approximately 1,320m^3 of non-hazardous waste during decommissioning. To calculate the volume of hazardous waste it is assumed that the 870 tonnes has a bulk density of 0.66 tonnes per m^3. This is less than 1% of the annual non-hazardous waste landfill capacity in northwest England. Thus, the magnitude of change is considered to be negligible.

6.5.74 The assessment considers the sensitivity to be high and the magnitude to be negligible. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Off-site disposal of hazardous waste

6.5.75 Hazardous waste, including bitumen material separated from the road planings generated through the decommissioning of the Site Campus and Park and Ride, is likely to be disposed of to a hazardous landfill in the worst case. Therefore, the sensitivity is considered to be high.

6.5.76 It should be noted that the assessment assumes that hazardous waste would be handled in northwest England as there are no suitable hazardous waste landfill sites in north Wales. In 2016, permitted hazardous waste landfill capacity in northwest England was approximately 6,481,000m^3. It is estimated that the decommissioning of the Site Campus and Park and Ride would produce approximately 2,335m^3 of hazardous waste. To calculate the volume of hazardous waste it is assumed that the 1,540 tonnes has a bulk density of 0.66 tonnes per m^3. This is less than 1% of the annual hazardous waste landfill capacity in northwest England. Thus, the magnitude of change is considered to be negligible.

6.5.77 The assessment considers the sensitivity to be high and the magnitude to be negligible. Therefore, the overall effect on the receiving waste management facilities is considered to be minor.

Decommissioning of Power Station and Off-Site Power Station Facilities

Types and sources of waste

6.5.78 Wastes are expected to be generated by the following Power Station and Off-Site Power Station Facilities decommissioning activities:

- de-planting of the main buildings, including the Reactor Building and turbine hall;
- de-planting of non-radioactive balance of plant, including culverts and tanks;
- demolition of site buildings and marine facilities; and
- final site clearance.

6.5.79 Horizon currently estimates that there would be a range of wastes and materials generated through the decommissioning process. Table C6-11 provides a summary of these estimates, including the types and likely management route of the waste.

Table C6-11 Summary of the estimated types and quantities of waste generated during the decommissioning phase of the Power Station and Off-Site Power Station Facilities

Waste arisings	Waste category	Waste types	Quantity (tonnes)	Intended management route
Mixed metals	Non-hazardous	Structural steel, reinforcement, gantries, cranes, plant supports, clean plant items, partition systems, cladding	180,000	Recycled and/or disposal at a third party off-site treatment facility
Concrete	Non-hazardous	Structural concrete, concrete pavement, masonry	1,500,000	Reused on-site as backfill
Timber	Non-hazardous	Doors, windows, skirtings	1,000	Recycled and/or disposal at a third party off-site treatment facility
Mixed construction	Non-hazardous	Insulation, plastics	22,500	Recycled and/or

Waste arisings	Waste category	Waste types	Quantity (tonnes)	Intended management route
waste				disposal at a third party off-site treatment facility
Gypsum	Non-hazardous	Plasterboard	2,500	Recycled and/or disposal at a third party off-site treatment facility
WEEE	Non-hazardous/ hazardous	Cables, panels, lighting units, transformers	31,000	Recycled and/or disposal at a third party off-site treatment facility
Various hazardous waste	Hazardous	Chemicals, oils	300	Hazardous disposal at a third party off-site
Total			1,737,300	

6.5.80 Waste arisings from the decommissioning phase would be segregated and stored ready for final treatment and/or disposal at the dedicated handling facilities. All wastes would be sent off-site for recycling or disposal as appropriate. It is anticipated that concrete type material would remain on-site and reused for backfill during the decommissioning phase.

6.5.81 An assessment of the capacities of the receiving waste management facilities to receive waste generated during the decommissioning of the Power Station and Off-Site Power Station Facilities has not been undertaken. This is due to the uncertainty of available waste management capacity in 60 years' time when the Power Station and Off-Site Power Station Facilities will be decommissioned.

Transboundary effects

6.5.82 It is anticipated that wastes generated during the construction, operation and decommissioning of the Power Station Site, Off-Site Power Station Facilities, Site Campus, Park and Ride and Logistics Centre of the Wylfa Newydd Project would be treated within north Wales and/or northwest England and would not be transported beyond UK borders for treatment or disposal. However, it is acknowledged that recycled materials are an international commodity and could be exported to be manufactured into new products. Nevertheless, the significance of transboundary effects on other European Economic Area states is considered to be negligible.

6.6 Additional mitigation

6.6.1 No additional mitigation measures have been identified for the construction, operation or decommissioning of the Wylfa Newydd Project.

6.7 Residual effects

6.7.1 No significant adverse effects were identified for waste and materials management.

6.7.2 Minor effects identified in the assessment of effects section are summarised in appendix I3-1 (master residual effects table) (Application Reference Number: 6.9.8).

6.8 References

Table C6-12 Schedule of references

ID	References
RD1	Natural Resource Wales (NRW). 2016. *Find details of permitted waste sites*. [Online]. [Accessed: 24 April 2017]. Available from: https://naturalresources.wales/our-evidence-and-reports/maps/find-details-of-permitted-waste-sites-in-wales-1/?lang=en
RD2	Welsh Assembly Government. 2010. *Towards Zero Waste*. [Online]. [Accessed: 04 April 2016]. Available from: http://gov.wales/docs/desh/publications/100621wastetowardszeroen.pdf
RD3	Environment Agency. 2016. *Waste data tables 2016*. [Online]. [Accessed: 28 September 2017]. Available from: https://www.gov.uk/government/publications/waste-management-for-england-2016
RD4	Contaminated Land: Applications in Real Environments (CL:AIRE). 2011. *The Definition of Waste: Development Industry Code of Practice*. Version 2. London: CL:AIRE.
RD5	Welsh Government. 2014.*Technical Advice Note 21: Waste*. [Online]. [Accessed: 04 April 2016]. Available from: http://gov.wales/docs/desh/publications/170223technical-advice-note-21-en.pdf
RD6	Jacobs. 2017. Site, Preparation and Clearance – Phase 3 Definition Numbered Appendices Series 200 – Site Clearance Rev. 8.0 Document Ref: WN02.04.01-JAC-OS-REP-00002.
RD7	KDC Contractors Limited. 2016. Wylfa Site - Pre-Demolition Audits & Asbestos Surveys Report_002
RD8	Department for Environment, Food and Rural Affairs. 2015. *Digest of Waste and Resource Statistics – 2015 edition*. [Online]. [Accessed: 04 April 2017]. Available from: https://www.gov.uk/government/statistics/digest-of-waste-and-resource-statistics-2015-edition
RD9	Welsh Assembly Government. 2009. *One Wales: One Planet – The Sustainable Development Scheme of the Welsh Assembly Government*. [Online]. [Accessed: 26 April 2017]. Available from: http://gov.wales/docs/desh/publications/090521susdev1wales1planeten.pdf
RD10	Environment Agency. 2016. *Environment Agency Guidance for the Control of Invasive Species including Japanese knotweed* [Online]. [Accessed: 05 April 2017]. Available from: https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants
RD11	RSK. 2016. Wylfa Waste Treatment Centre Technical Note Final, Appendix 3 Rev03.

ID	References
RD12	Environment Agency. 2014. *Regulatory position statement 075: The movement and use of treated asphalt waste containing coal tar*. [Online]. [Accessed: 28 September 2017]. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/419686/LIT_10118.pdf.

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