12 Summary of Mitigation Measures, Monitoring and Likely Residual Effects

12.1 Introduction

12.1.1 This Chapter provides tabulated summaries of the mitigation measures, monitoring requirements and likely residual effects resulting from the construction (Table 12.1), operational (Table 12.2) and decommissioning (Table 12.3) stages of the Development, as identified in Chapters 7-10 and ES Volume II.

12.1.2 No cumulative effects have been identified of the Development in combination with other development projects. As such, there is no further discussion on cumulative effects in this chapter.

12.1.3 Mitigation measures are designed into the Development to reduce potentially significant adverse effects where possible. As summary of the key embedded mitigation measures and how they were (or are) secured is provided below together with monitoring measures, as required by the 2015 Permission and Permit. Details of additional mitigation measures identified by the EIA process are set out under 'Additional Mitigation Measures'.

Summary of Embedded Mitigation

12.1.4 A summary of key embedded mitigation measures is provided below for the construction phase (retrospective), the completed operational Development, and any future decommissioning phase.

Construction (Retrospective)

- Contaminated land and remedial strategy prior to commencement of works **(Planning Condition)**.
- Construction Phase Plan (CPP) (Appendix 6.1), including the erection of construction hoarding, site lighting control, emissions management plans **(Planning Condition).**
- Adherence to the Project Environmental Plan (PEP) (Appendix 6.2) including adherence to a Traffic Management Plan **(Planning Condition)**.

Operational Development

- Adoption of best available technology (BAT) **(subject to assessment by NRW as part of Permit).**
- Adherence to the NRW Environmental Permit requirements (including adherence to a Noise Management Plan, Dust and Particulate Emission Management Plan, Emergency Plan; Accident Management Plan; Fire Prevention and Mitigation Plan) **(Permit, dust control measures also subject to Condition)**.
- Adherence to approved drainage scheme including surface water pollution control **(Planning Condition)**.

- Implementation of a lighting scheme designed in line with current best practice (**Planning Condition. Revised lighting design scheme to be installed by the Appellant in Summer 2022**).
- Adherence to limits on the quality and quantity of incoming waste wood fuel feedstock**(Permit)**.
- Adherent to limits on the quantity of incoming waste wood fuel feedstock **(Planning Condition)**.
- Adherence to specified delivery times/days **(Planning Condition)**.
- Waste acceptance, processing, storage and disposal processes managed in accordance with the BAT requirements and controlled to prevent pollution **(Permit)**.
- Adherence to agreed process for the removal and disposal of ash waste **(Planning Condition)**.
- Adherence to pollution incident prevention and control procedures **(Permit)**.
- Adherence to all process plant controls to ensure that the Facility operates within its consented noise and air quality emission limits at all times (i.e. it will not be subject to uncontrolled emissions releases) **(Environmental Permit)**.
- Adherence to condition which requires the roller shutter doors in the Feedstock Building to be kept closed at all times other than when deliveries are being received **(Planning Condition)**.
- Restriction of the feedstock type to waste wood only **(Planning Condition and Permit).**
- Implementation of a Green Travel Plan **(Planning Condition)**.
- Adherence to approved external facing materials including the colour of the building and the stack **(Planning Condition)**,

Decommissioning

- Written Site Closure Plan which identifies and minimises risks of pollution including those arising from closure **(Permit)**.

12.2 Monitoring

12.2.1 The 2015 Permission requires the following monitoring and post-construction surveys to be completed:

- **Air quality** – for a period of nine months after being fully operational, Condition 31 requires a further Air Quality Assessment through monitoring at the nearest residential property locations (57 Dock View Road, Cory Way and Estrella House, Cei Dafydd).
- **Noise** – requires a noise survey post installation at the nearest residential premises (as above) when the plant is initially commissioned and again after six months.

12.2.2 Schedule 3, Table S3.1 of the Permit (Appendix 1.2) details environmental monitoring that must be undertaken by the Appellant for legal compliance with the NRW Permit. Table S3.1 sets out the parameters for monitoring including the aspects to be monitored, their frequency and monitoring standards. A detailed explanation of monitoring requirements

under the Permit is provided in Section 6.9 of the NRW Permit Decision Notice (Appendix 1.2).

12.2.3 The Development has Continuous Emissions Monitors (CEMS) located on the exhaust flues of the gasification plant. The CEMS system will monitor the stack emissions and provide data reporting. The dust monitor provides added flow, stack pressure and temperature. All analysers are provided with remote control, calibration and maintenance. The continuous monitoring equipment will operate on a 24-hour basis.

12.2.4 Process effluent emissions will be monitored and sampled in accordance with the requirements stipulated by the effluent discharge consent (to sewer) which is already in place. All effluent discharges will be monitored using online equipment and backed up with periodic third party extractive sampling. The online monitoring equipment allows constant monitoring of the water emissions, while periodic measurement will detect any problem with the waste to energy process.

12.2.5 In addition, the Appellant is required to carry out ongoing fuel measurement and sampling procedure, as part of their routine process monitoring programme. This will include the following:

- Syngas measurements and flow rate determination;
- Fossil fuel consumption;
- Bottom ash; and
- Electrical output.

12.2.6 The Permit specifies the requirements for reporting of environmental monitoring information to NRW in line with the Industrial Emissions Directive (IED).

12.2.7 The Development will operate to an Environmental Management System in accordance with ISO:14001 which will ensure that procedures are in place for fuel input and raw material management. All necessary operating procedures will be in place and documented and stored within the EMS. A number of management plans, as stated above, are also in place and will be subject to ongoing monitoring and review.

12.2.8 Further details of the monitoring requirements of the Permit for both normal and abnormal operating conditions are provided in Section 6.9 of the NRW Permit Decision (Appendix 1.2).

12.2.9 Any potential decommissioning of the Development would be subject to a Site Closure Plan that will be agreed with NRW pursuant to the Permit ahead of decommissioning taking place. A soil and groundwater monitoring plan would also be submitted to NRW for approval prior to Permit surrender to demonstrate that necessary measures have been taken to ensure the Development does not pose a risk to soil or groundwater.

12.2.10 The ES has not identified a need for any additional monitoring of environmental effects.

Summary of Additional Mitigation

12.2.11 The ES has identified a need for further mitigation measures in respect of Noise only to minimise noise effects at future residential receptor locations at Barry Dock Waterfront development. These measures are detailed in Section 8.6 of Chapter 8: Noise and Vibration. The Appellant is intending to install further noise mitigation measures over Summer 2022.

12.2.12 No other additional mitigation measures have been identified by the ES.

Table 12.1: Summary of Construction Phase (Retrospective) Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Climate Change and Greenhouse Gases					
Assessed under Operational Phase (as whole life carbon assessment)					
Noise and Vibration					
Construction noise	Residential (high) and offices (medium)	Local study area	Temporary	None identified	Negligible
Construction vibration	Residential (high) and offices (medium)	Local study area	Temporary	None identified	Negligible/ Minor adverse
Construction traffic	Any noise sensitive receptor along study area (high)	Traffic Consultant advised study area	Temporary	None identified	Negligible
Air Quality					
Dust and Particulate Matter generated during the construction phase	Surrounding area (sensitivity to dust = medium; Sensitivity to particulate matter = low)	Local	Temporary	The adoption of best practice measures outlined in the IAQM guidance	Negligible
Population and Human Health					
Changes in local air quality	High	Local	Temporary	N/A	Slight adverse[i] (not significant)
Changes in noise exposure	High	Local	Temporary	N/A	Slight adverse[i] (not significant)
Changes in transport nature and flow rate	High	Local	Temporary	N/A	Slight adverse[i] (not significant)
Landscape and Visual Impact Assessment					

[i] Assessment based on worst-case scenario of population.

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Landscape character					
Inland Water	Mid to lower end of the spectrum (B)	Local	Temporary	PEP ensured construction activities were confined to the Site.	Indirect, short-term, neutral, not significant
Barry Island – Established	Lower end of the spectrum (A)	Local	Temporary	PEP ensured construction activities were confined to the Site.	Indirect, short-term, neutral, not significant
Docks	Lower end of the spectrum (A)	Local	Temporary	PEP ensured construction activities were co to the Site.	Localised direct, in parts indirect, short-term, neutral, not significant
Views and Visual Environment					
Residents on Dock View Road – Representative viewpoints 1 to 4 and 9	Mid to high range of the spectrum (D).	Local	Temporary	N/A	Direct, short term, adverse, significant
Residents on Dyfrig Street (between Dock Road and Redbrink Point) - Representative viewpoints 12	Mid to high range of the spectrum (D).	Local	Temporary	N/A	Direct, short-term, neutral, not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Residents off Charles Darwin Way (including the newly constructed properties) which are orientated towards the northeast. - Representative viewpoint 11	Mid-range of the spectrum (C).	Local	Temporary	N/A	Direct, short term, adverse, significant
Pedestrians on the footpath alongside Dock View Road - Representative viewpoints 1 to 4 and 9	Mid-range of the spectrum (C).	Local	Temporary	N/A	Direct, short-term, neutral, not significant
Pedestrians using the new public space and walkway associated with the new development to the south of 'Dock 1' Representative viewpoint 11	Lowest end of the spectrum. (A)	Local	Temporary	N/A	Direct, short term, adverse, significant
Pedestrians on Ffordd-y-Mileniwm - Representative viewpoint 10	Mid-range of the spectrum.	Local	Temporary	N/A	Direct, short term, adverse, not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
(representative of Wales Coast Path).					
Drivers and road users on Dock View Road. - Representative viewpoints 1 to 4 and 9	Lowest end of the spectrum.(A)	Local	Temporary	N/A	Direct, short-term, adverse, not significant
Those working in the Council Offices – travelling and working	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, short-term, neutral, not significant
Those occupied in the Dock activities of Dock 2– travelling and working	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, short-term, neutral, not significant

Table 12.2: Summary of Operational Development Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Climate Change and Greenhouse Gases					
Whole Life GHG Emissions	N/A	Global	Permanent	N/A	Beneficial (Not Significant)
Noise and Vibration					
Operational noise	Residential (high)	Local study area	Permanent	Additional noise mitigation measures required due to effects at receptors R1-R3 at night-time only. On-site noise monitoring	R1: Minor adverse R2: Minor adverse R3: Minor adverse R4: Negligible R5: Negligible
	Private gardens (high)	Local study area	Permanent	-	Negligible
	Public outdoor amenity space (medium)	Local study area	Permanent	-	Negligible
	Offices (medium)	Local study area	Permanent	-	Negligible
	Café (low)	Local study area	Permanent	-	Negligible
	Industrial (negligible)	Local study area	Permanent	-	Negligible
Operational vibration	All receptors	Local study area	Permanent	-	Negligible
Operational traffic	Any noise sensitive receptor along study area (high)	Traffic Consultant advised study area	Permanent	-	Negligible
Air Quality					
Effects on Local Air Quality from emissions from plant	Surrounding area (Human and ecological receptors)	Local	Permanent	None Required	Negligible / Insignificant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Population and Human Health					
Changes in local air quality	High	Local	Permanent	N/A	Slight adverse[ii] (not significant)
Changes in noise exposure	High	Local	Permanent	Continuous 24-hour environmental noise monitoring to alert the site operator of noise issues	Slight adverse[ii] (not significant)
Changes in transport nature and flow rate	High	Local	Permanent	N/A	Slight adverse[ii] (not significant)
Risk Perception	High	Local	Temporary	Publicly accessible monitoring data and engagement	Slight adverse[ii] (not significant)
Landscape and Visual Impact Assessment					
Landscape character					
Inland Water	Mid to lower end of the spectrum (B)	Local	Temporary	N/A	Indirect, medium - term, neutral, not significant
Barry Island – Established Townscape	Lower end of the spectrum (A)	Local	Temporary	N/A	Indirect, medium - term, neutral, not significant
Docks	Lower end of the spectrum (A)	Local	Temporary	N/A	Localised direct, in parts indirect, medium-term,

[ii] Assessment based on worst-case scenario of population.

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
					beneficial, not significant
Views and Visual Environment					
Residents on Dock View Road – Representative viewpoints 1 to 4 and 9	Mid to high range of the spectrum (D)	Local	Temporary	N/A	Direct, medium-term, adverse, not significant
Residents and users of the open space in the new East Quay Development – Viewpoint 5	Mid to high range of the spectrum (D).	Local	Temporary	N/A	No change
Residents on Dyfrig Street (between Dock Road and Redbrink Point) - Representative viewpoints 12	Mid to high range of the spectrum (D)	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Residents off Charles Darwin Way (including the newly constructed properties) which are orientated towards the northeast. -	Mid to high range of the spectrum (D)	Local	Temporary	N/A	Direct, medium-term, neutral, not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Representative viewpoint 11					
Pedestrians on the footpath alongside Dock View Road - Representative viewpoints 1 to 4 and 9	Mid-range of the spectrum (C).	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Pedestrians using the new public space and walkway associated with the new development to the south of 'Dock 1' Representative viewpoint 11	Mid-range of the spectrum (C).	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Pedestrians on Ffordd-y-Mileniwm - Representative viewpoint 10 (representative of Wales Coast Path).	Mid-range of the spectrum (C).	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Drivers and road users on Dock View Road. - Representative viewpoints 1 to 4 and 9	Lower end of the spectrum (A)	Local	Temporary	N/A	Direct, medium-term, neutral, not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Residents on Dock View Road – Representative viewpoints 1 to 4 and 9	Lower end of the spectrum (A)	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Residents on Dyfrig Street (between Dock Road and Redbrink Point) - Representative viewpoints 12	Lower end of the spectrum (A)	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Those working in the Council Offices – travelling and working	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, medium-term, neutral, not significant
Those occupied in the Dock activities of Dock 2– travelling and working	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, medium-term, neutral, not significant

Table 12.3: Summary of Decommissioning Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Climate Change and Greenhouse Gases					
Scoped out of assessment					
Noise and Vibration					
Decommissioning Noise	Residential (high) and offices (medium)	Local study area	Temporary	Adherence to Best Practicable Means (BPM)	Negligible
Decommissioning vibration	Residential (high) and offices (medium)	Local study area	Temporary	Adherence to BPM	Negligible
Decommissioning traffic	Any noise sensitive receptor along study area (high)	Traffic Consultant advised study area	Temporary	Adherence to BPM	Negligible
Air Quality					
Dust and Particulate Matter generated during the decommissioning phase	Surrounding area (sensitivity to dust = medium; Sensitivity to particulate matter = low)	Local	Temporary	The adoption of best practice measures outlined in the IAQM	Negligible
Population and Human Health					
Changes in local air quality	High	Local	Temporary	N/A	Slight adverse[iii] (not significant)
Changes in noise exposure	High	Local	Temporary	N/A	Slight adverse[iii] (not significant)

[iii] Assessment based on worst-case scenario of population

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Changes in transport nature and flow rate	High	Local	Temporary	N/A	Slight adverse[iii] (not significant)
Landscape and Visual Impact Assessment					
Landscape character					
Inland Water	Mid to lower end of the spectrum	Local	Temporary	BPM	Indirect, short-term, neutral, not significant
Barry Island – Established	Lower end of the spectrum	Local	Temporary	BPM	Indirect, short-term, neutral, not significant
Docks	Lower end of the spectrum	Local	Temporary	BPM	Localised direct in parts indirect, short-term, neutral, not significant
Views and Visual Environment					
Residents on Dock View Road – Representative viewpoints 1 to 4 and 9	Mid to high range of the spectrum.	Local	Temporary	N/A	Direct, short term, adverse, significant moving to beneficial on completion of decommissioning.
Residents on Dyfrig Street (between Dock Road and Redbrink Point) - Representative viewpoints 12	Mid to high range of the spectrum.	Local	Temporary	N/A	Direct, short-term, neutral, not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Residents off Charles Darwin Way (including the newly constructed properties) which are orientated towards the northeast. - Representative viewpoint 11	Mid-range of the spectrum.	Local	Temporary	N/A	Direct, short term, adverse, not significant
Residents and users of the open space in the new East Quay Development – Viewpoint 5	Mid to high range of the spectrum.	Local	Temporary	N/A	Direct, short term, adverse, significant moving to beneficial on completion of decommissioning.
Pedestrians on the footpath alongside Dock View Road - Representative viewpoints 1 to 4 and 9	Mid-range of the spectrum.	Local	Temporary	N/A	Direct, short-term, neutral, moving to beneficial on completion of decommissioning, significant.
Pedestrians on Ffordd-y-Mileniwm - Representative viewpoint 10 (representative of Wales Coast Path).	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, short term, neutral, not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Drivers and road users on Dock View Road. - Representative viewpoints 1 to 4 and 9	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, short term, adverse, moving to beneficial on completion of decommissioning, not significant
Those working in the Council Offices – travelling and working	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, short-term, adverse, moving to beneficial on completion of decommissioning, not significant
Those occupied in the Dock activities of Dock 2– travelling and working	Lowest end of the spectrum.	Local	Temporary	N/A	Direct, short-term, neutral, not significant
Residents on Dock View Road – Representative viewpoints 1 to 4 and 9	Mid to high range of the spectrum.	Local	Temporary	N/A	Direct, short-term, neutral, not significant

Table 12.4: Summary of Cumulative Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Climate Change and Greenhouse Gases					
Whole Life GHG Emissions	N/A	Global	Permanent	N/A	Beneficial (Not Significant)
Noise and Vibration					
Construction	Residential (high) and non-residential receptors (medium)	10km radius	Temporary	-	Negligible
Operation	Residential (high) and non-residential receptors (medium)	10km radius	Permanent	-	Negligible
Decommissioning	Residential (high) and non-residential receptors (medium)	10km radius	Temporary	-	Negligible
Cumulative Traffic	Any noise sensitive receptor along study area (high)	Traffic Consultant advised study area	Permanent	-	Negligible
Air Quality					
Construction	Surrounding area (sensitivity to dust = medium; Sensitivity to particulate matter = low)	Local	Temporary	The adoption of best practice measures outlined in the IAQM guidance	Negligible
Operation	Surrounding area (Human and ecological receptors)	Local	Temporary	None Required	Negligible / Insignificant
Population and Human Health					
Effects as discussed in Table 12.1, 12.2 and 12.3					

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Mitigation and Monitoring	Likely Residual Effect
Landscape and Visual Impact Assessment					
Landscape character					
No residual effects likely, see section 4 of LVIA					
Views and Visual Environment					
No residual effects likely, see section 4 of LVIA					