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ACOUSTICS & AIR QUALITY

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ROSS DAVY ASSOCIATES

NOISE IMPACT ASSESSMENT REPORT

ROSS DAVY ASSOCIATES, PELHAM HOUSE, 1 GROSVENOR STREET, GRIMSBY, NORTH EAST LINCOLNSHIRE DN32 0QH

Client: Ross Davy Associates

Report Ref: P6424-R1-V1

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REPORT REFERENCE **P6424-R1-V1**

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NOISE IMPACT ASSESSMENT REPORT

REPORT VERSION CONTROL:

Document Reference	Date	Report Prepared by	Report Checked and Authorised by
P6424-R1-V1	28/06/2023	Reid Malster, Bsc(Hons), PGDip, AMIOA	M. J. Malone, BSc (Hons), MIOA
			

CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Overview

1.1.1 By instruction from Ross Davy Associates ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) to support an ongoing planning application (planning ref DM/0850/21/FUL) within the administrative boundary of North East Lincolnshire Council (NELC).

1.1.2 A noise assessment was previously undertaken to nearby residential receptors, however, we understand that Natural England have requested an assessment of noise impact on ecological receptors.

1.1.3 This report has been prepared in response to this request and assesses both the operation of the proposed plant and equipment, and construction noise scenarios as appropriate.

1.1.4 General limitations with respect to this NIA are outlined in **Appendix A**.

1.2 Site Description

Figure 1: Site Location and Noise Sensitive Receptors

1.2.1 **Figure 1** shows the location of the proposed development site. To north-east is the Humber Estuary SSSI. To north of the site is a field that is functionally linked to the SSSI. We understand that nesting birds move into the field when water levels rise. To the southwest of

the proposed development site is a potentially functionally linked site (we understand that nesting birds from the SSSI may use these fields.

1.2.2 The proposed development site is within the existing Lenzing Fibres site. Lenzing fibres is located within an established industrial employment area occupied by industrial and commercial businesses.

1.2.3 The existing noise environment generally consists of distant road traffic noise and vehicle movements along Energy Way. Activities from commercial businesses and processes also contribute to the noise environment.

1.2.4 Due to the proximity of the site to the Humber Estuary, wind speeds are typically elevated. Wind movement was observed to be a significant contributor to the existing noise levels in the area due to the movement of wind itself, and the effect of rustling grass, foliage, etc. Within the functionally linked site to the north of the proposed development site, noise contributions from the South Humber Bank Power Station become more apparent.

1.3 Development Proposals and General Information

1.3.1 The description of the proposal is as follows: “erect waste-water treatment plant with associated access, plant and equipment, install site office, car parking and temporary access with parking and contractor’s compound.”

1.3.2 We understand that at present, a waste-water pipe from the industrial and employment area offloads effluent water from the various businesses into the Humber Estuary. The proposal would reduce contaminants and pollutants within effluent water contributions from Lenzing fibres by 90% in line with new EU regulations.

1.3.3 **Figure 2** shows the proposed site plan and **Figure 3** shows a 3D computer model of the proposals. Five large cylindrical tanks would be located outside with various items of plant and equipment in operation. Two small buildings would also be located on-site housing further plant and equipment.

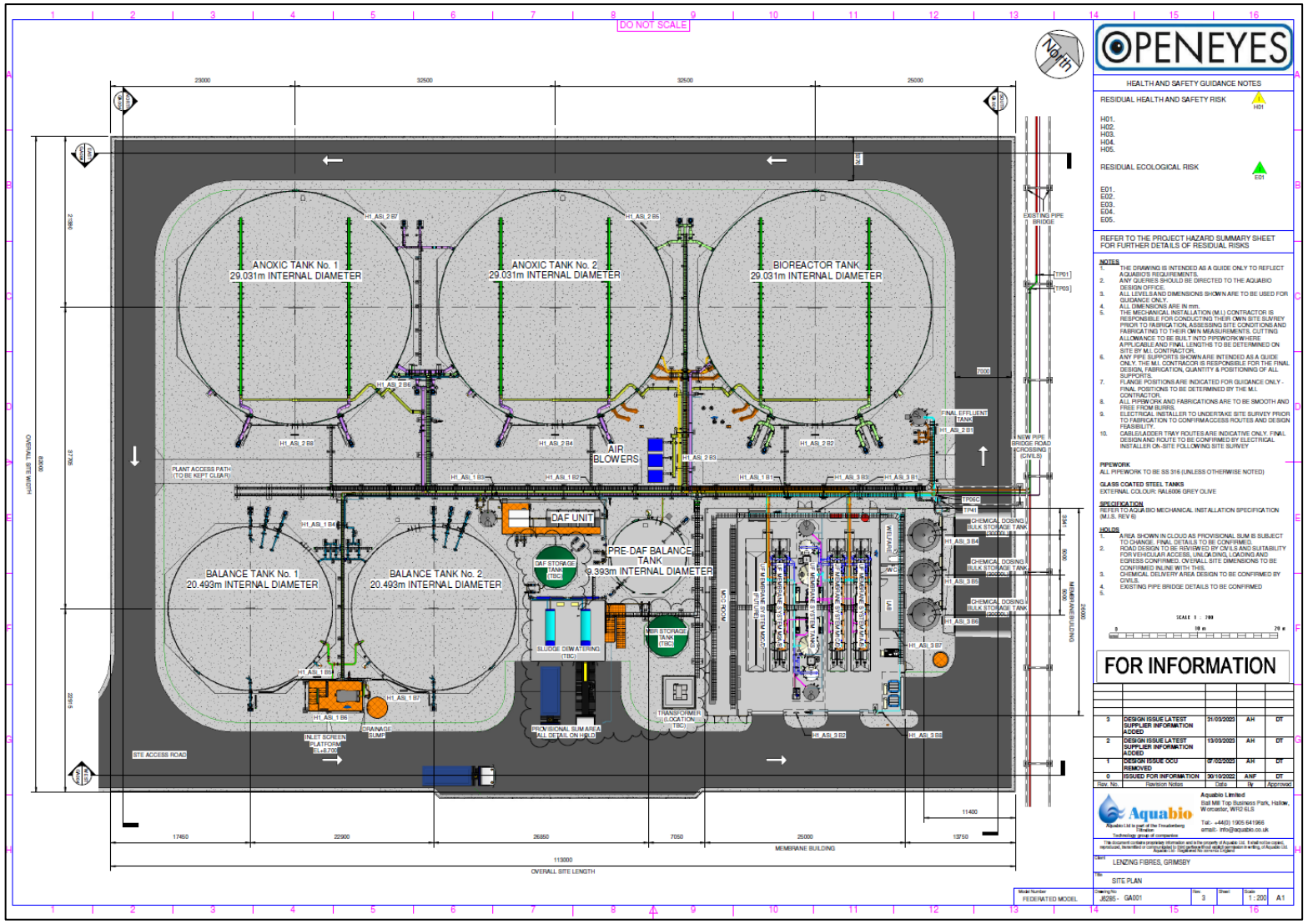

Figure 2: Proposed Site Plan

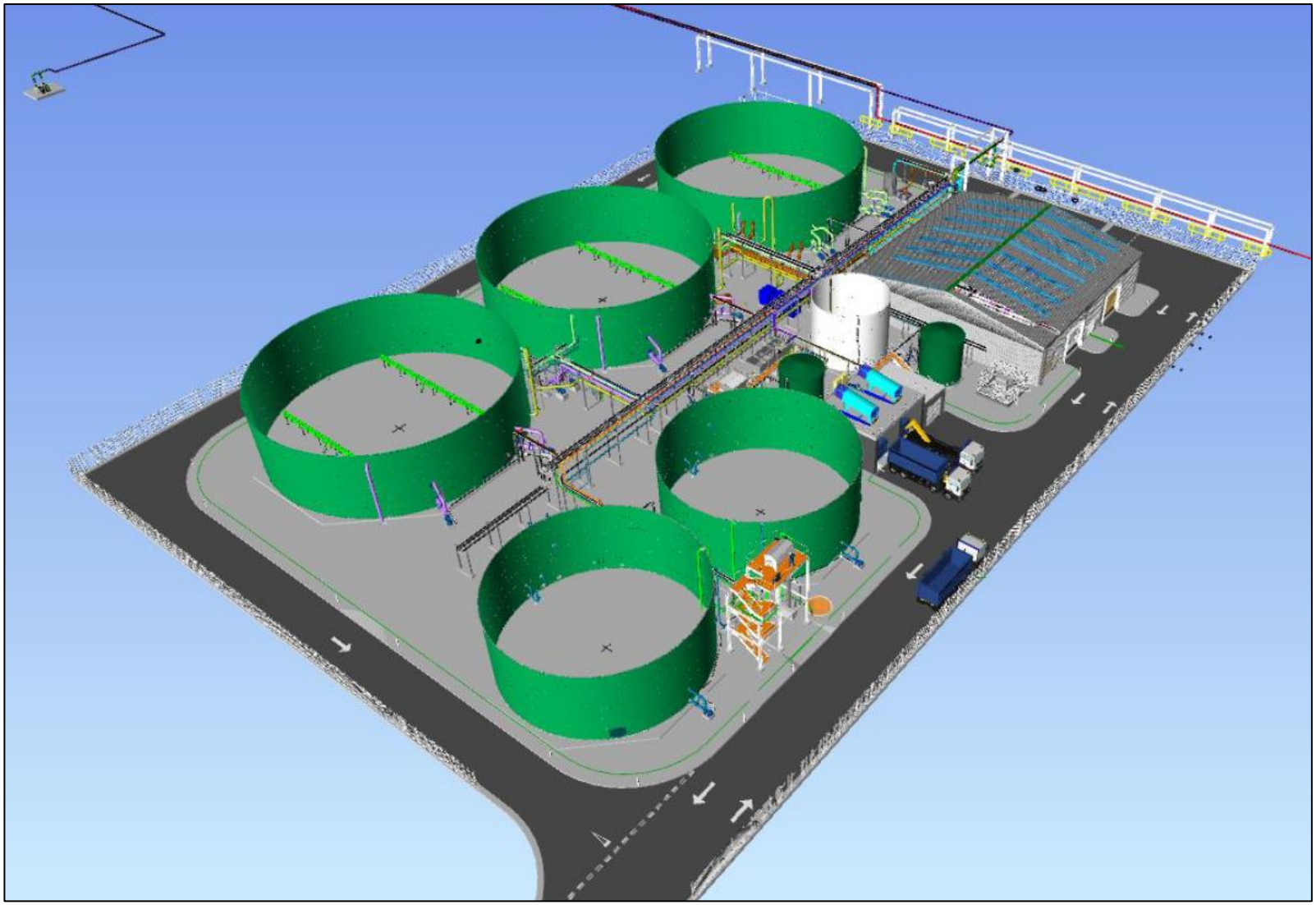

Figure 3: 3D Computer Model of Proposed Site

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Consultation

2.1.1 We understand that Natural England are supportive of the principle of improving the quality of effluent water offloaded into the Humber Estuary but require evidence to demonstrate that the proposals would not create noise impact issues as a result.

2.1.2 Relevant excerpts from Natural England's consultation response are provided below:

> *"The following information is required:*
>
> *Further information relating to potential noise disturbance impacts during construction and operation on the Humber Estuary SPA/Ramsar/SSSI and functionally linked land"*
>
> *"Natural England advises that an assessment is made for both construction and operational noise against the existing noise environment using a range of noise measurements – e.g. L_{Aeq}/ L_{Amax}. This should present the expected noise against the existing noise at the sensitive receptor (i.e. the designated site boundary and areas of potentially functionally linked land) and set this in the context of the existing noise environment, using a 3 dB rule of thumb to determine significance. Natural England advises that noise disturbances impacts to functionally linked land should also be considered in the assessment. We note that 1.1.8. of the HRA states 'beyond the site boundary is an arable field which is currently farmed'. Therefore, potential noise disturbance impacts on this field as potential functionally linked land should al be assessed in the HRA.*
>
> *If it is concluded that likely significant effects cannot be ruled out, further assessment should be provided in an appropriate assessment, including consideration of suitable mitigation measures, where appropriate. Mitigation may include restrictions on trimming of works (e.g. outside the sensitive wintering period)., or noise mitigation equipment and/or acoustic barriers, for example."*

2.1.3 NoiseAir Ltd have undertaken a further consultation with Natural England and are in receipt of an internal Natural England document providing guidance on noise impacts on birds. Assessment criteria within this report will be drawn from this document.

2.1.4 NELC were also consulted by NoiseAir Ltd, who provided clarification on the location of the potentially functionally linked areas that required assessing along with the SSSI.

2.2 Scope of Works

2.2.1 This report assesses the noise impact of the three main construction phases, and the proposed operational scenario on the Humber Estuary SSSI and the two potentially functionally linked sites.

2.2.2 Noise monitoring has been undertaken at the site to inform the assessment. Construction noise and operational noise has been modelled within a 3D SoundPlan computer model of the site based on the proposals provided to NoiseAir Ltd.

2.2.3 The noise monitoring and modelling results have then been assessed in accordance with 'A Review of the Effects of Noise on Birds (2018)'. The document is an internal Natural England guidance document and is not public, but has been shared with NoiseAir Ltd for the purposes of undertaking this assessment. Key elements of the document relating to this assessment are summarised below.

Natural England Guidance – A Review of the Effects of Noise on Birds (2018)

2.2.4 The document provides guidance on the potential harmful effects of noise on birds, for example, elevated stress levels, increased vigilance that reduces food intake, energy expenditure due to sudden noises causing flight and interference with inter-species communication.

2.2.5 The document suggests an assessment methodology comparing proposed noise levels to existing noise levels. It suggests that a change of 3 dB may be 'significant' and refers to this as the '3 dB rule of thumb'.

2.2.6 Based on the guidance document, proposed noise should be controlled so that any increase in the existing L_{Aeq} level is limited to 3 dB.

2.2.7 The document also discussed L_{AFmax} events but recognises that different species will react in different ways to L_{AFmax} noise levels. The document cites studies that birds begin to react (e.g., heads-up, alarm calls) to a noise level above 50 dB, and that moderate to high disturbance (birds moving away) occur above 70 dB. The document suggests that 70 dB could be a maximum level, but that this is largely dependent on the type of bird, the noise source and the context of the area, meaning that an appropriate limit would lie between 50-70 dB.

2.2.8 However, the document notes that "the derivation of this threshold seems to be largely related to studies of noise disturbance associated with construction works on the Humber Estuary and therefore most applicable to similar locations.

2.2.9 Given that this assessment relates directly to potential noise impact on Humber Estuary birds, the 50-70 dB conclusion would be directly applicable to the proposals at the Lenzing site.

3 ACOUSTIC SURVEYS

3.1 Survey of Existing Noise Levels

3.1.1 Existing noise levels were measured at an unattended monitoring location representative of the Humber Estuary SSSI. Given that the monitoring location is far away from local noise sources (e.g., roads), it is considered to be worst-case for the purposes of assessing the functionally linked sites, and directly representative of the Humber Estuary.

3.1.2 The monitoring locations are shown on **Figure 4** below.

Figure 4: Noise Monitoring Location

3.1.3 The monitoring equipment consisted of a NOR140 Class 1 sound level meter (SLM) with enhanced windshield and calibrated to traceable standards.

3.1.4 The measurements were made in accordance with BS 7445: Part 1: 2003 'Description and measurement of environmental noise – Guide to quantities and procedures' and BS 7445: Part 2: 1991 'Description and measurement of environmental noise – Guide to the acquisition of data pertinent to land use'.

3.1.5 The SLM's were calibrated upon installation and collection of the survey and found to have negligible drift (<0.3 dB).

3.1.6 Details of the SLM and associated field calibration can be found in **Table 1** below:

Table 1: Summary of SLM used for survey and associated field calibration						
SLM (Serial Number)	**Preamp (Serial Number**	**Microphone (Serial Number)**	**Calibrator (Serial Number)**	**Start Calibration**	**End Calibration**	**Drift**
NOR140 (1402867)	NOR1209 (12113)	NOR1225 (102533)	BK4231 (2699086)	-26.1	-26.4	0.3 dB

3.1.7 The monitoring results are shown graphically in **Charts 1**. The full dataset is available upon request.

3.1.8 The monitoring location was not subjectively observed to be influenced by audible road traffic noise or industrial processes. The dominant noise sources were typically natural sources influenced by wind (e.g. grass, foliage, water etc being moved by wind). This is likely to be normal for the area given that windspeeds are typically elevated by the Humber Estuary.

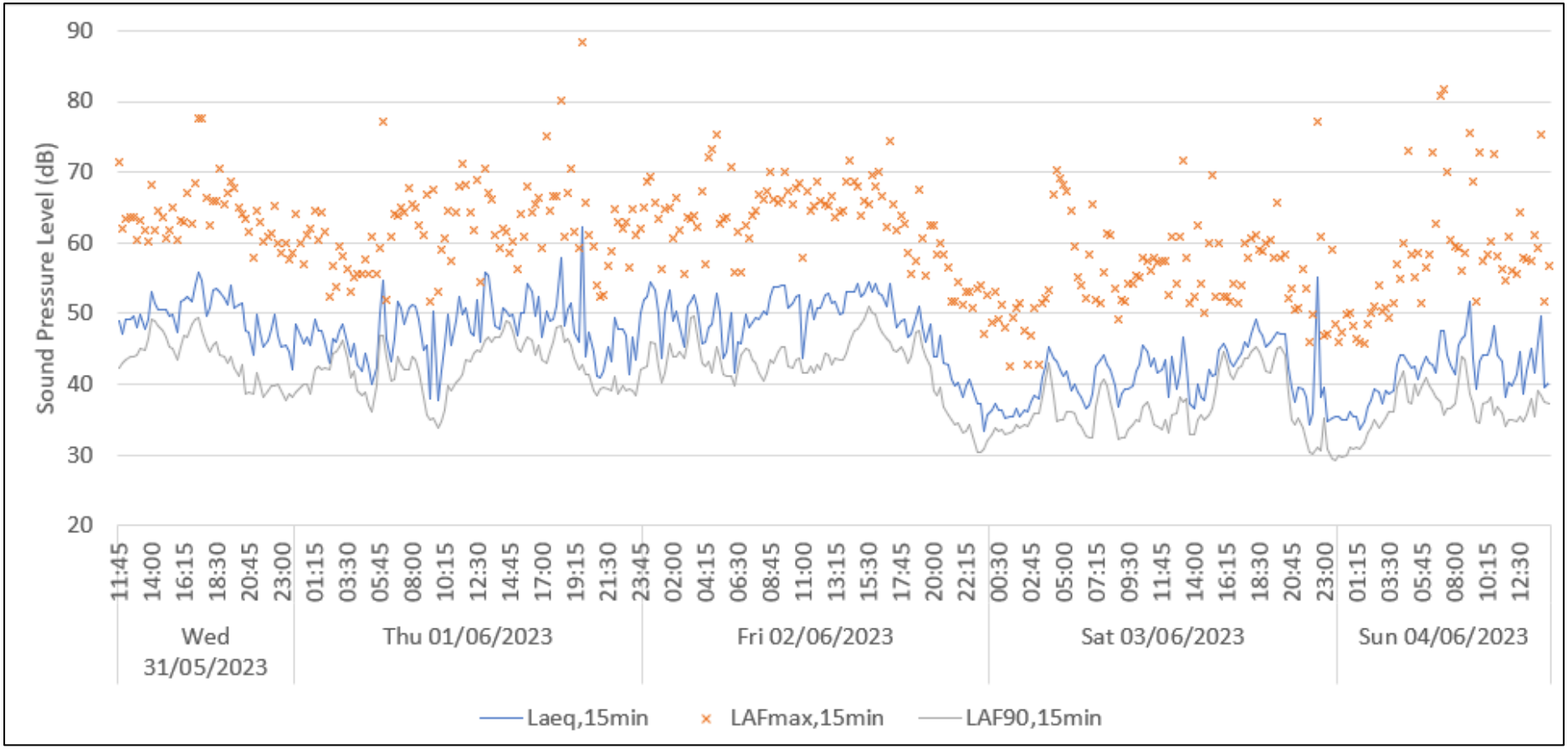

Chart 1: Noise Monitoring Results at ML1

3.2 Survey Data Analysis

3.2.1 We understand from the applicant that construction activities would take place between 07:00-18:00 on weekdays. Occasionally works may be planned for Saturday's between 07:00-13:00. Analysis of the data for the purposes of assessing construction phases has therefore been undertaken for these periods.

3.2.2 We understand that the proposed operational scenario is a 24/7 process. We have therefore analysed weekend data for the purposes of assessing the operational scenario.

3.2.3 The measured data for the relevant assessment periods is presented in **Table 2** below.

Table 2: Summary of Noise Monitoring Results

Time Period Monitored			Measured Noise Level		
Start	**End**	**To Assess**	**$L_{Aeq,T}$ (dB)**	**$L_{AF90,T}$ (dB)**	**$L_{AFmax,15min}$ Range (dB)**
Sat 03/06/2023 07:00	Sat 03/06/2023 23:00	Operational Scenario Daytime	44	35	46-77
Sat 03/06/2023 23:00	Sun 04/06/2023 07:00	Operational Scenario Night-time	40	31	46-73
Thu 01/06/2023 07:00	Thu 01/06/2023 18:00	Construction Phases Weekday	50	43	52-75
Sat 04/02/2023 07:00	Sun 05/02/2023 13:00	Construction Phases Weekend	42	34	49-65

3.2.4 Following the Natural England guidance document, the L_{Aeq} limits for each scenario are as follows:

- **Operational Scenario** – 43 dB $L_{Aeq,T}$
- **Construction Phases (Weekday)** – 53 dB $L_{Aeq,T}$
- **Construction Phases (Weekend)** – 45 dB $L_{Aeq,T}$

3.2.5 An L_{AFmax} limit for construction noise lies somewhere between 50-70 dB L_{AFmax}. Based on the measured noise levels L_{AFmax} events in this range would be consistent with the existing ambient acoustic environment on weekdays in terms of absolute noise levels. For Saturday construction periods, events between 66-70 dB L_{AFmax} would result in an increase in terms of absolute noise levels. The Natural England guidance would consider 68 dB L_{AFmax} to be 'potentially significant' in this regard when compared to existing pre-development noise levels.

4 NOISE IMPACT ASSESSMENT

4.1 3D Noise Model

4.1.1 A 3D noise model has been created in SoundPLAN™ to calculate the predicted noise levels at the proposed residential dwellings. The model uses the calculation method from ISO 9613-2:19961 to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings.

4.1.2 Construction phase scenario noise sources are based on a combination of manufacturer's noise levels and construction noise levels from BS 5228-1:2009+A1:2014. All manufacturer's noise level data available is presented in Appendix C.

4.1.3 Noise levels were predicted for the following modelling scenarios:

1) Construction Phase 1 (22/05/2023 – 09/06/2023)

Table 3: Construction Phase 1 Sources

Plant/Equipment	Noise Level	No. in Noise Model	Source
Volvo 20 Tonne Excavator	102 dB L_w	1	Manufacturer
Caterpillar E320 Excavator	103 dB L_w	1	Manufacturer
Volvo A25 Dump truck	108 dB L_w	1	Manufacturer
Volvo Roller	105 dB L_w	1	Manufacturer
Bolmag Roller	106 dB L_w	1	Manufacturer

[1] ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

2) Construction Phase 2 (12/06/2023 – 14/07/2023)

Table 4: Construction Phase 2 Noise Sources			
Plant/Equipment	**Noise Level**	**No. in Noise Model**	**Source**
Volvo 20 Tonne Excavator	102 dB L_w	2	Manufacturer
Volvo A25 Dump truck	108 dB L_w	3	Manufacturer
Volvo Roller	105 dB L_w	1	Manufacturer
Bolmag Roller	106 dB L_w	1	Manufacturer
Caterpillar 20 Tonne Excavator	103 dB L_w	1	Manufacturer
Leibherr 20 Tonne Excavator	103 dB L_w	1	Manufacturer
Volvo 40 Tonne Excavator	79 dB L_{Aeq} @ 10m	1	BS 5228 Table C2.14
Crusher	84 dB L_{Aeq} @ 10m	1	BS 5228 Table C2.15

3) Construction Phase 3 (17/06/2023 – 15/09/2023)

Table 5: Construction Phase 3 Noise Sources			
Plant/Equipment	**Noise Level**	**No. in Noise Model**	**Source**
Volvo 20 Tonne Excavator	102 dB L_w	2	Manufacturer
Volvo A25 Dump truck	108 dB L_w	3	Manufacturer
Caterpillar 13 Tonne Excavator	70 dB L_{Aeq} @ 10m	1	BS 5228 Table C2.25
Pile Rig	88 dB L_{Aeq} @ 10m	2	BS 5228 Table C3.8

4) Construction Activities – Typical L_{AFmax}

An L_{AFmax} event of 120 dB has been modelled at an indicative location. This would be representative of typical L_{AFmax} levels that could occur on-site during construction phases.

5) Operational Scenario

The operational phase scenario has been modelled based on the plans provided in Appendix B and the equipment list and accompanying markups provided in Appendix B. This results in a combined total of 98 noise sources at both indoor and outdoor locations.

Internal noise sources have been modelled within buildings with an R_w of 43 dB. This is based on the plans provided to us, which show a Kingspan cladding. The sound reduction figure originates from Kingspan's Acoustic Performance Guide.

The operational phase also includes screening from the proposed tanks and building.

4.1.4 For the construction scenarios (excluding the L_{AFmax} scenario), each individual item of plant has an estimated 'on-time' of 40 minutes (e.g., the activity would produce an average of 40 minutes of continuous noise every 60 minutes). For the operational phase, all sources are assumed to operate for 100% of the time. We understand that, in reality, some sources will not operate during the night-time, meaning that the modelling predictions are worst-case.

4.1.5 The results for each scenario are summarised in the table below. Results are rounded to the nearest whole number.

Table 6: Noise Modelling Results

Assessment Scenario	Humber Estuary SSSI Predicted Level	Functionally Linked Land Predicted Level	Potentially Functionally Linked Land Predicted Level
Construction Phase 1	41 dB L_{Aeq}	49 dB L_{Aeq}	48 dB L_{Aeq}
Construction Phase 2	42 dB L_{Aeq}	51 dB L_{Aeq}	50 dB L_{Aeq}
Construction Phase 3	40 dB L_{Aeq}	48 dB L_{Aeq}	47 dB L_{Aeq}
Construction Activities – Typical L_{AFmax}	47 dB L_{AFmax}	56 dB L_{AFmax}	55 dB L_{AFmax}
Operational Scenario	23 dB L_{Aeq}	29 dB L_{Aeq}	32 dB L_{Aeq}

4.1.6 The full noise grid predictions for each scenario are given in Appendix D.

4.2 Assessment of Impact – Natural England Criteria

4.2.1 The modelled noise levels are compared against the Natural England criteria derived from the on-site noise survey in the tables below.

Table 7: Assessment of Construction Noise L_{Aeq} Levels to Natural England Criteria

Assessment Scenario	Highest Predicted L_{Aeq} Noise Level (dB)	Weekday Construction Hours Limit (dB)	Compliant Yes/No	Weekend Construction Hours Limit (dB)	Compliant (Yes/No)
Construction Phase 1	49	53	Yes (-4)	45	No (+4)
Construction Phase 2	51	53	Yes (-2)	45	No (+6)
Construction Phase 3	48	53	Yes (-5)	45	No (+3)

4.2.2 The L_{Aeq} assessments demonstrate that construction activities on weekdays would be compliant with Natural England guidance. The required criteria would be exceeded during any weekend construction periods.

4.2.3 Subject to Natural England and Local Authority approval, weekend construction works may still be suitable outside of the sensitive nesting period.

4.2.4 However, the lower weekend noise levels appear to be due to a decrease in windspeeds below typical levels for the area rather than noise sources that would be directly linked weekday/weekend working or traffic patterns.

4.2.5 Given that the surveyed weekday noise levels occurred during a period of more typical windspeeds in the area, the weekday noise levels are likely to be more representative of typical noise levels 7 days a week (since windspeeds are not tied to weekday or weekend periods).

4.2.6 Consideration of the above coupled with consideration of the L_{AFmax} levels being within the acceptable range identified in Natural England guidance (which was determined based on studies along the Humber Estuary), would lead to the conclusion that under typical circumstances construction works would be acceptable regardless of weekday or weekend periods.

4.2.7 We understand that weekend construction works would only be required if out of necessity to prevent delays. The short term impact of reduced hours during a Saturday period may

have a lesser impact than delays to the schedule causing construction works to enter the sensitive nesting period.

Table 8: Assessment of Operation Noise L_{Aeq} Levels to Natural England Criteria			
Assessment Scenario	**Highest Predicted L_{Aeq} Noise Level (dB)**	**Weekend Night-time Limit (dB)**	**Compliant Yes/No**
Operational Scenario	32	43	Yes (-11)

4.2.8 The highest predicted L_{AFmax} level is 56 dB. This is within the 50-70 dB range recommended by Natural England and is deemed to be compliant.

• CONCLUSIONS

4.2.9 By instruction from Ross Davy Associates (the client'), NoiseAir was commissioned to undertake a noise impact assessment to ecological receptors in relation to the construction and operation of a proposed effluent water treatment process at Lenzing Fibres Ltd, Grimsby.

4.2.10 The information provided within the report was requested by Natural England within their consultee response to the ongoing planning application for the site. Natural England have provided a guidance document containing assessment criteria relevant to birds.

4.2.11 A noise survey was undertaken at the site. Construction and operational noise were modelled within a 3D noise model of the site. The results were assessed in accordance with the Natural England guidance provided.

4.2.12 The assessment concluded that the criteria would be achieved during weekday construction activities and during the operational scenario. Weekend construction activities would exceed the required criteria, however, this may be acceptable outside of the sensitive nesting period if permitted by Natural England and the Local Planning Authority.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Ross Davy Associates and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Ross Davy Associates and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by NoiseAir Limited. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

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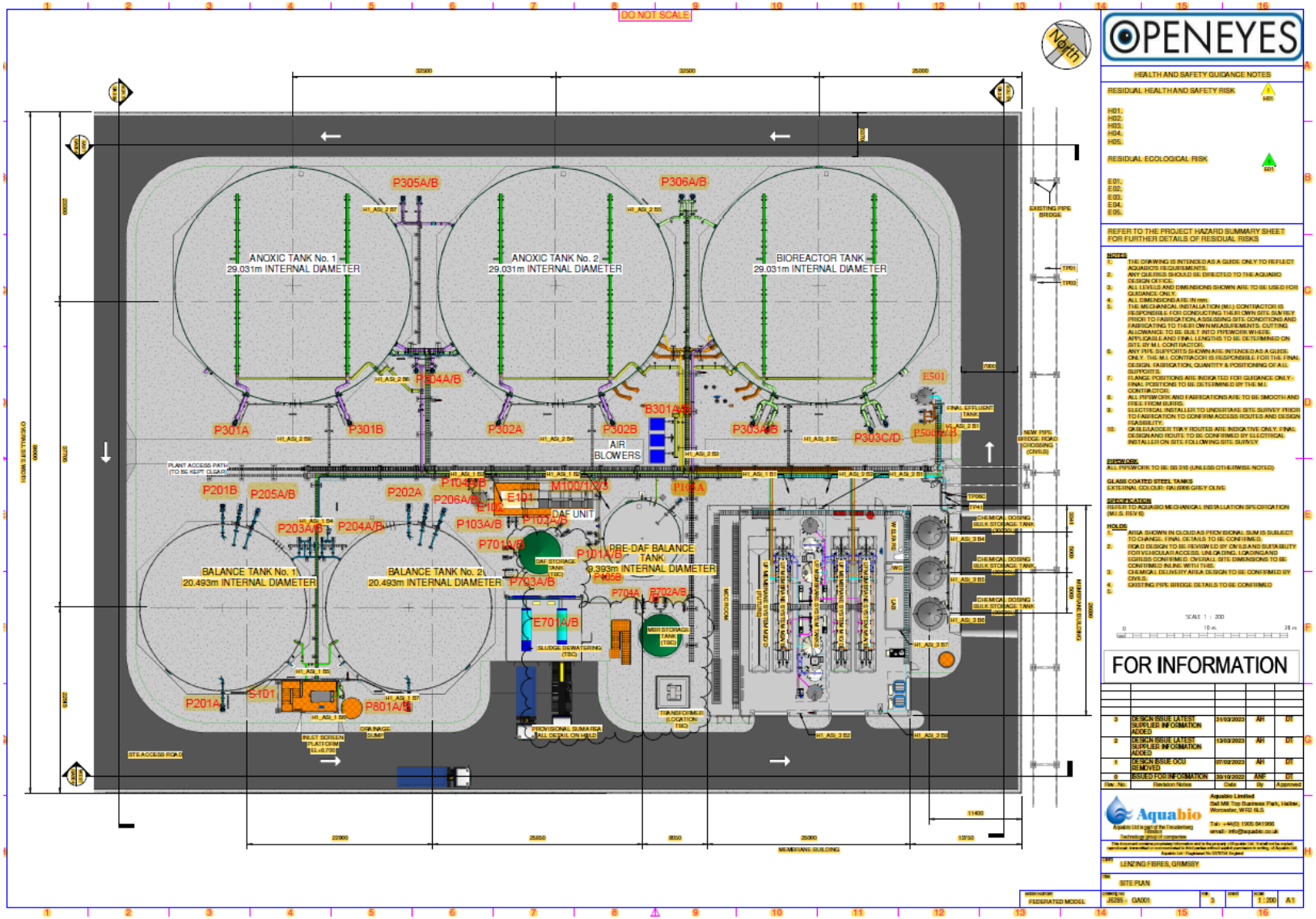
APPENDIX B – PROPOSED PLANS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North
OPENEYES
HEALTH AND SAFETY GUIDANCE NOTES
RESIDUAL HEALTH AND SAFETY RISK
RESIDUAL ECOLOGICAL RISK
REFER TO THE PROJECT HAZARD SUMMARY SHEET FOR FURTHER DETAILS OF RESIDUAL RISKS
NOTES
ANOXIC TANK No. 1
29.031m INTERNAL DIAMETER
ANOXIC TANK No. 2
29.031m INTERNAL DIAMETER
BIOREACTOR TANK
29.031m INTERNAL DIAMETER
BALANCE TANK No. 1
20.493m INTERNAL DIAMETER
BALANCE TANK No. 2
20.493m INTERNAL DIAMETER
PRE-DAF BALANCE TANK
9.393m INTERNAL DIAMETER
AIR BLOWERS
DAF UNIT
MEMBRANE BUILDING
FOR INFORMATION
Aquabio Limited
LENZING FIBRES, GRIMSBY
SITE PLAN
FEDERATED MODEL
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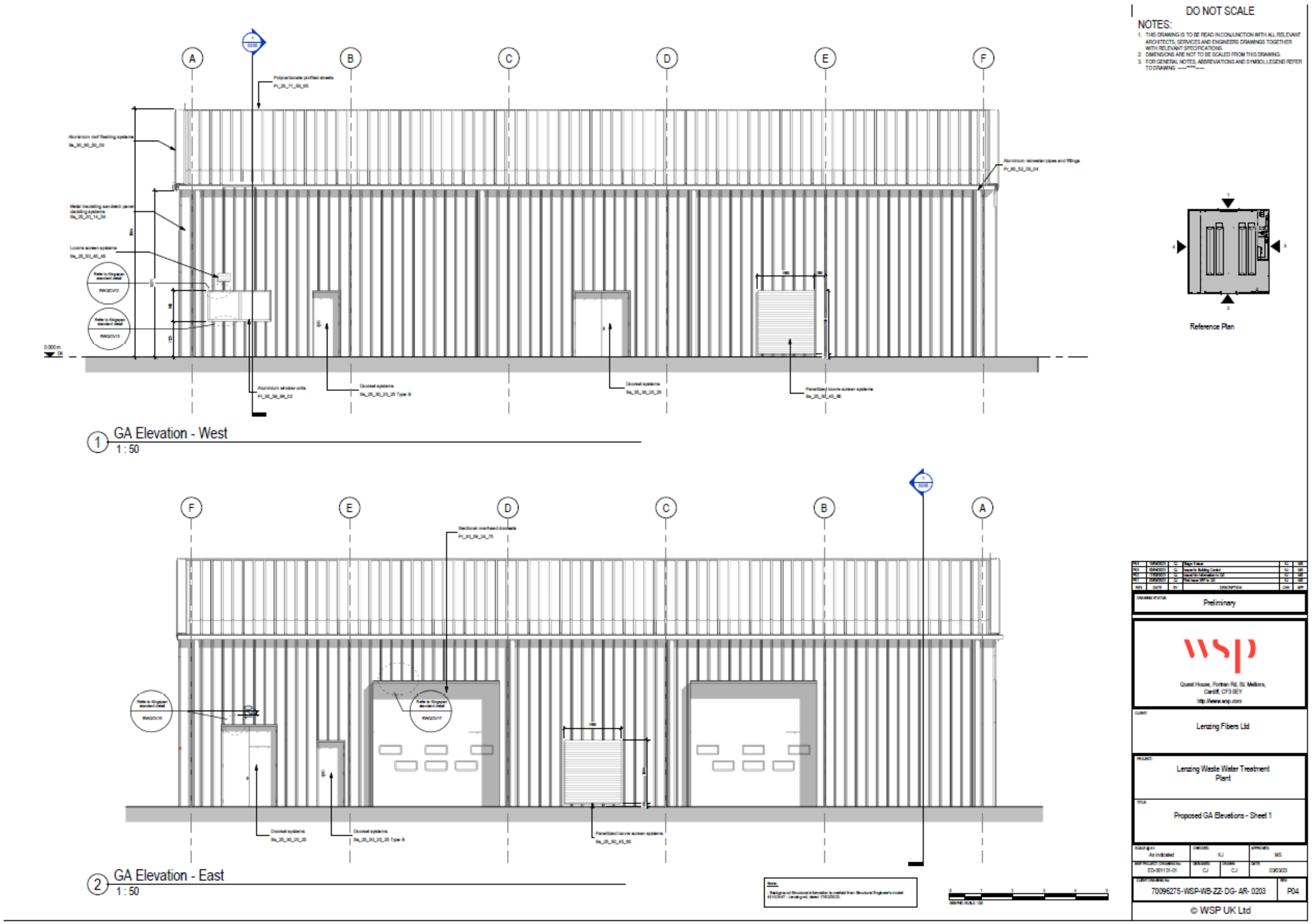
A1



DO NOT SCALE
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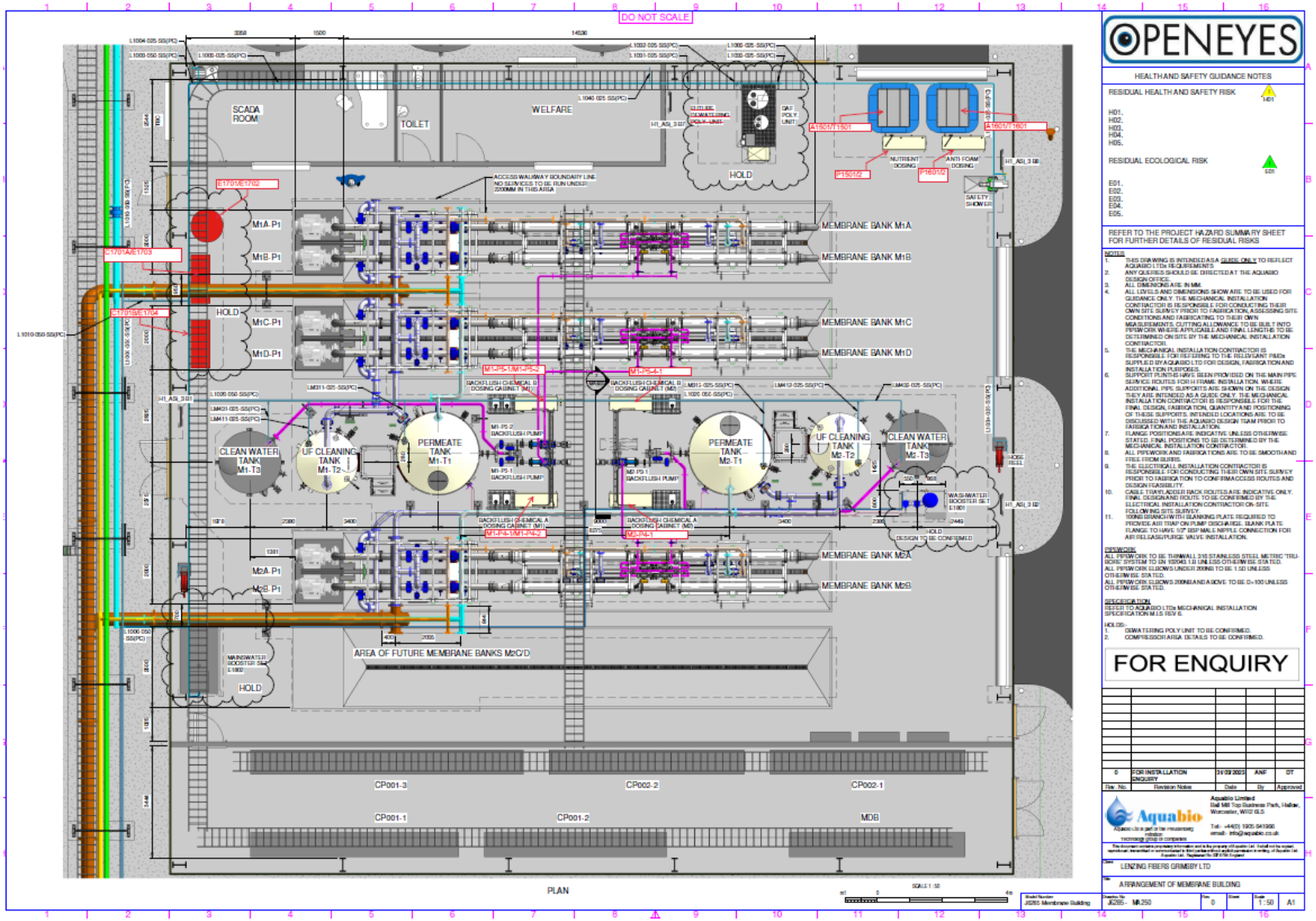
GA Elevation - East
1 : 50
Reference Plan
Preliminary
wsp
Lenzing Fibers Ltd
Lenzing Waste Water Treatment Plant
Proposed GA Elevations - Sheet 1
P04
© WSP UK Ltd


DO NOT SCALE
SCADA ROOM
TOILET
WELFARE
HOLD
MEMBRANE BANK M1A
MEMBRANE BANK M1B
MEMBRANE BANK M1C
MEMBRANE BANK M1D
MEMBRANE BANK M2A
MEMBRANE BANK M2B
CLEAN WATER TANK M1-T3
UF CLEANING TANK M1-T2
PERMEATE TANK M1-T1
PERMEATE TANK M2-T1
UF CLEANING TANK M2-T2
CLEAN WATER TANK M2-T3
AREA OF FUTURE MEMBRANE BANKS M2C/D
CP001-3
CP002-2
CP002-1
CP001-1
CP001-2
MDB
PLAN
OPENEYES
HEALTH AND SAFETY GUIDANCE NOTES
RESIDUAL HEALTH AND SAFETY RISK
H01.
H02.
H03.
H04.
H05.
RESIDUAL ECOLOGICAL RISK
E01.
E02.
E03.
E04.
E05.
REFER TO THE PROJECT HAZARD SUMMARY SHEET FOR FURTHER DETAILS OF RESIDUAL RISKS
NOTES
1. THIS DRAWING IS INTENDED AS A GUIDE ONLY TO REFLECT AQUABIO LTDs REQUIREMENTS
2. ANY QUERIES SHOULD BE DIRECTED AT THE AQUABIO DESIGN OFFICE.
3. ALL DIMENSIONS ARE IN MM.
4. ALL LEVELS AND DIMENSIONS SHOW ARE TO BE USED FOR GUIDANCE ONLY. THE MECHANICAL INSTALLATION CONTRACTOR IS RESPONSIBLE FOR CONDUCTING THEIR OWN SITE SURVEY PRIOR TO FABRICATION, ASSESSING SITE CONDITIONS AND FABRICATING TO THEIR OWN MEASUREMENTS. CUTTING ALLOWANCE TO BE BUILT INTO PIPEWORK WHERE APPLICABLE AND FINAL LENGTHS TO BE DETERMINED ON SITE BY THE MECHANICAL INSTALLATION CONTRACTOR.
5. THE MECHANICAL INSTALLATION CONTRACTOR IS RESPONSIBLE FOR DESIGNING TO THE RELEVANT PMDs SUPPLIED BY AQUABIO LTD FOR DESIGN, FABRICATION AND INSTALLATION PURPOSES.
6. SUPPORT PLINTHS HAVE BEEN PROVIDED ON THE MAIN PIPE SERVICE ROUTES FOR H FRAME INSTALLATION. WHERE ADDITIONAL PIPE SUPPORTS ARE SHOWN ON THIS DESIGN THEY ARE INTENDED AS A GUIDE ONLY. THE MECHANICAL INSTALLATION CONTRACTOR IS RESPONSIBLE FOR THE FINAL DESIGN, FABRICATION, QUANTITY AND POSITIONING OF THESE SUPPORTS. INTENDED LOCATIONS ARE TO BE DISCUSSED WITH THE AQUABIO DESIGN TEAM PRIOR TO FABRICATION AND INSTALLATION.
7. FLANGE POSITIONS ARE INDICATIVE UNLESS OTHERWISE STATED. FINAL POSITIONS TO BE DETERMINED BY THE MECHANICAL INSTALLATION CONTRACTOR.
8. ALL PIPEWORK AND FABRICATIONS ARE TO BE SMOOTH AND FREE FROM BURRS.
9. THE ELECTRICAL INSTALLATION CONTRACTOR IS RESPONSIBLE FOR CONDUCTING THEIR OWN SITE SURVEY PRIOR TO FABRICATION TO CONFIRM ACCESS ROUTES AND DESIGN FEASIBILITY.
10. CABLE TRAY/LADDER RACK ROUTES ARE INDICATIVE ONLY. FINAL DESIGN AND ROUTE TO BE CONFIRMED BY THE ELECTRICAL INSTALLATION CONTRACTOR ON-SITE FOLLOWING SITE SURVEY.
11. 100NB BRANCH WITH BLANKING PLATE REQUIRED TO PROVIDE AIR TRAP ON PUMP DISCHARGE. BLANK PLATE FLANGE TO HAVE 1/2" BSP MALE NIPPLE CONNECTION FOR AIR RELEASE/PURGE VALVE INSTALLATION.
PIPEWORK
ALL PIPEWORK TO BE THINWALL 316 STAINLESS STEEL METRIC 'TRU-BORE' SYSTEM TO EN 10296-1 D UNLESS OTHERWISE STATED.
ALL PIPEWORK ELBOWS UNDER 200NB TO BE 1.5D UNLESS OTHERWISE STATED.
ALL PIPEWORK ELBOWS 200NB AND ABOVE TO BE D=100 UNLESS OTHERWISE STATED.
SPECIFICATION
REFER TO AQUABIO LTDs MECHANICAL INSTALLATION SPECIFICATION M.I.S REV 6.
NOTES:
1. DEWATERING POLY UNIT TO BE CONFIRMED.
2. COMPRESSOR AREA DETAILS TO BE CONFIRMED.
FOR ENQUIRY
Rev. No. | Revision Notes | Date | By | Approved
0 | FOR INSTALLATION ENQUIRY | 31/03/2023 | ANF | DT
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Tel: +44(0) 1905 641999
email: info@aquabio.co.uk
LENZING FIBERS GRIMSBY LTD
ARRANGEMENT OF MEMBRANE BUILDING
JG265 - MB250
Rev. 0
Scale 1:50
A1

APPENDIX C – CONSTRUCTION PHASE MANUFACTURER DATA

P151

UK declaration of conformity

BOMAG
FAYAT GROUP

for machines
acc. to Supply of Machinery (Safety) Regulations 2008

Name of manufacturer:	BOMAG GmbH
Adress:	Industriegebiet Hellerwald D-56154 BOPPARD Germany

We hereby declare that the series production machine:

Designation:	Tandem vibratory roller
Type:	BW 138 AD-5 Vibratory Tandem Roller
Serial number:	101650461708
Engine type:	Kubota V2403-CR-E5B
Nominal power, engine [kW]:	34.10
Nominal speed, engine [min^{-1}]:	2400
corresponds to all relevant provisions of the directive:	Machinery (Safety) Regulations 2008 3)
In addition, the machine has been manufactured in compliance with the requirements of the EMC directive:	2016 6)
We hereby also declare that the series production machine mentioned above complies with all relevant provisions of the directive:	Noise Emission Regulations 2001 7)
For the machine, which is subject to:	Noise limits
the conformity assessment procedure acc. to:	Full quality assurance
was applied, under participation of the designated body:	TÜV Rheinland LGA Products GmbH Tillystraße 2 D-90341 Nürnberg
Measured sound power level $L_{WA,m}$:	103 dB(A)
Guaranteed sound power level $L_{WA,g}$:	106 dB(A)
The following harmonized standards:	EN 500-1:2006 + A1:2009 9) EN 500-4:2011 10) were applied.
Name of person responsible for documentation:	Ulrich Drees
Address of person responsible for documentation:	Hellerwald, D-56154 Boppard

56154 Boppard, 01.03.2019

i.V. Krings
Albertus Krings
Project Manager

THE UK DECLARATION OF CONFORMITY IS ONLY VALID IN CONNECTION WITH THE CORRESPONDING SCOPE OF DELIVERY AND THE CLEARLY VISIBLE UKCA-SIGN ATTACHED BY THE ABOVE MENTIONED MANUFACTURER OF THE MACHINE. THE UK DECLARATION OF CONFORMITY SHOULD BE KEPT IN A SAFE PLACE.

3) Supply of Machinery (Safety) Regulations 2008; 6) Electromagnetic Compatibility Regulations 2016; 7) Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001; 9) EN 500-1 Mobile road construction machines - Safety Part 1: Common requirements; 10) EN 500-2 Mobile road construction machines – Safety - Part 2: Special requirements for road milling machines; 11) EN 500-3 Mobile road construction machines - Safety - Part 3: Special requirements for soil stabilizing machines and recycling machines; 12) EN 500-4 Mobile road construction machines - Safety - Part 4: Special requirements for compactors; 13) EN 500-6 Mobile road construction machines - Safety - Part 6: Special requirements for road finishers; 14) EN 474-1 Earth-moving machines - Safety - Part 1: General requirements; 15) EN 474-11 Earth-moving machines - Safety - Part 11: Requirements for earth and refuse compactors

CATERPILLAR

ORIGINAL EU DECLARATION OF CONFORMITY

Manufacturer: CATERPILLAR INC., 100 N.E. ADAMS STREET, PEORIA, IL 61629, U.S.A.

Person authorised to compile the Technical File and to communicate relevant part(s) of the Technical File to the Authorities of European Union Member States on request:
Standards & Regulations Manager, Caterpillar France S.A.S 40, Avenue Leon-Blum B.P.55 F38041, Grenoble Cedex 9

I, the undersigned, Bob De Lange, hereby certify that the construction equipment specified hereunder

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Hydraulic Excavator
	Model/Type:	313F L GC
	Serial Number:	*CAT0313FCGJD00564*
	Commercial Name:	Caterpillar

Fulfils all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2000/14/EC as amended by 2005/88/EC (1)	TÜV SÜD INDUSTRIE (2)	OR/011120/030
2006/42/EC	..... N/A	313FLGC-AKA1503
2004/108/EC	..... N/A	313FLGC-AKA1503
2014/30/EU	..... N/A	313FLGC-AKA1503

(1) Guaranteed Sound Power Level - 99 dB(A) Annex VI
Representative Equipment Type Sound Power Level - 97 dB(A)
Engine Power per ISO 14396 - 54.0 kW Rated Engine speed - 1700 RPM
Technical Documentation accessible through person listed above authorised to compile the Technical File

(2) TÜV SÜD INDUSTRIE SERVICE GMBH, Westendstraße 199, D - 80686 München

Harmonised Standards Taken Into Consideration: EN 474-1:2006+A4:2013; EN 474-5:2006+A3:2013; EN 13309:2010

Done at
Caterpillar Asia Pte. Ltd.
7 Tractor Road
Singapore 627968
Date
2016-04-19

Signature

Name / Position
Bob De Lange / Administrative

CATERPILLAR

EC DECLARATION OF CONFORMITY OF MACHINERY

Manufacturer: CATERPILLAR INC., 100 N.E. ADAMS STREET, PEORIA, IL 61629, U.S.A.

Person authorised to compile the Technical File and to communicate relevant part(s) of the Technical File to the Authorities of European Union Member States on request:
Standards & Regulations Manager, Caterpillar France S.A.S 40, Avenue Leon-Blum B.P.55 F38041, Grenoble Cedex 9

I, the undersigned, Bob De Lange, hereby certify that the construction equipment specified hereunder

Description:

Generic Denomination:	Earth-moving Equipment
Function:	Hydraulic Excavator
Model/Type:	320E L
Serial Number:	*CAT0320ECNAZ01932*
Commercial Name:	Caterpillar

Fulfils all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2000/14/EC as amended by 2005/88/EC (1)	TÜV SÜD INDUSTRIE (2)	OR/011101/013
2006/42/EC	..... N/A	320EL-AKA1307
2004/108/EC	..... N/A	320EL-AKA1307

(1) Guaranteed Sound Power Level - 103 dB(A) Annex VI
Representative Equipment Type Sound Power Level - 103 dB(A)
Engine Power per ISO 14396 - 112.0 kW Rated Engine speed - 1800 RPM
Technical Documentation accessible through person listed above authorised to compile the Technical File

(2) TÜV SÜD INDUSTRIE SERVICE GMBH, Westendstraße 199, D - 80686 München

Harmonised Standards Taken Into Consideration: EN 474-1:2006+A4:2013; EN 474-5:2006+A3:2013

Done at
Caterpillar Asia Pte. Ltd.
7 Tractor Road
Singapore 627968
Date
2015-03-24

Signature

Name / Position
Bob De Lange / Administrative

P072

EC DECLARATION OF CONFORMITY FOR MACHINERY (IIA)
(Original Document)

Volvo Construction Equipment hereby declares that the below specified product:

Manufacturer	:Volvo Construction Equipment AB
Address	:Carl Lihnells Väg, 363 41 Braås
Country	:Sweden
Category	:Earth Moving Machinery
Make	:Volvo
Type	:Articulated Hauler
Model	:A25G
Power [kW]	:235kW
Representative sound power level [dB(A)]	:108
Guaranteed sound power level [dB(A)]	:108
PIN	:VCE0A25GC00342334
In conjunction with	
Type	:---
Model	:---
s/n	:---

in the state in which it was placed on the market, and excluding components added and/or operations carried out subsequently is in conformity with the relevant provisions of Essential Health and Safety requirements of:

EC Directive "Machinery"	2006/42/EC
EC Directive "Outdoor Noise"	2000/14/EC
EC Directive "Electromagnetic Compatibility"	2014/30/EC

and their amendments relating to machinery, and other applicable directives

The following harmonized standards apply:

Earth Moving machinery - Safety Part 1	EN 474-1:2006+A4:2013
Earth Moving machinery - Safety Part 6	EN 474-6:2006+A1:2009

Technical file compiled by	Mats Karlsson Volvo Construction Equipment AB; Carl Lihnells väg 363 41 BRAÅS Sweden
Notified Body	0404, RISE SMP Svensk Maskinprovning AB; Box 7035, SE-750 07 UPPSALA, Sweden

This declaration includes attachments developed designed/approved, marked and marketed by above-mentioned manufacturer.

Jonas Lakhall/Production Manager

Braås, 29.08.2018

Braås, 29.08.2018

EC DECLARATION OF CONFORMITY FOR MACHINERY (IIA)
(Original Document)

Volvo Construction Equipment hereby declares that the below specified product:

Manufacturer	:Volvo Construction Equipment GMBH
Address	:Max-Planck-Str. 1, 54329 Konz-Könen
Country	:Germany
Category	:Earth Moving Machinery
Make	:Volvo
Type	:Hydraulic Excavator
Model	:EC220EL
Power [kW]	:129
Representative sound pressure [dB(A)]	:99
Guaranteed sound pressure [dB(A)]	:102
PIN	:VCEC220EA00322028
In conjunction with	
Type	:---
Model	:---
s/n	:---

in the state in which it was placed on the market, and excluding components added and/or operations carried out subsequently is in conformity with the relevant provisions of Essential Health and Safety requirements of:

EC Directive "Machinery"	2006/42/EC
EC Directive "Outdoor Noise"	2000/14/EC
EC Directive "Electromagnetic Compatibility"	2014/30/EU

and their amendments relating to machinery, and other applicable directives

The following harmonized standards apply:

Earth Moving machinery - Safety Part 1	EN 474-1:2006+A4:2013
Earth Moving machinery - Safety Part 5	EN 474-5:2006+A3:2013

Technical file compiled by	Timo Zenner; Product Platform Manager Excavator Konz; Volvo CE Germany GmbH, Max-Planck-Str.1, D-54329 Konz
Notified Body	0515: DGUV Test, Prüf- und Zertifizierungsstelle, Fachbereich Bauwesen, D-80687 München (Germany);

This declaration includes attachments developed designed/approved, marked and marketed by above-mentioned manufacturer.

Heinrich Schaaf; Quality Assurance

Konz-Könen, 23.04.2018

Konz-Könen, 23.04.2018

EC DECLARATION OF CONFORMITY FOR MACHINERY (IIA)
(Original Document)

Volvo Construction Equipment hereby declares that the below specified product:

Manufacturer	:ABG Allgemeine Baumaschinen-Gesellschaft mbH
Address	:Kuhbrueckenstr. 18, 31785 Hameln
Country	:Germany
Category	:Vibrating Roller for compacting base courses
Make	:Volvo
Type	:Vibrating Roller
Model	:SD135B
Power [kW]	:110
Representative sound power level [dB(A)]	:102.6
Guaranteed sound power level [dB(A)]	:105
PIN	:VCES135BL0H556255
In conjunction with	
Type	:---
Model	:---
s/n	:---

in the state in which it was placed on the market, and excluding components added and/or operations carried out subsequently is in conformity with the relevant provisions of Essential Health and Safety requirements of:

EC Directive "Machinery"	2006/42/EC
EC Directive "Outdoor Noise"	2000/14/EC
EC Directive "Electromagnetic Compatibility"	2014/30/EC

and their amendments relating to machinery, and other applicable directives

The following harmonized standards apply:

Mobile Road construction machinery - Safety Part 1	EN 500-1
Mobile Road construction machinery - Safety Part 4	EN 500-4

Technical file compiled by	Thomas Lossow, Director Platform; ABG Allgemeine Baumaschinen-Gesellschaft mbH, Kuhbrückenstr. 18, 31785 Hameln
Notified Body	DGUV Test Prüf- und Zertifizierungsstelle Fachbereich Bauwesen c/o BG BAU - Prävention Am Knie 6, 81241 München Notified Body number: 0515;

This declaration includes attachments developed designed/approved, marked and marketed by above-mentioned manufacturer.

Dirk Heusing, General Manager

Hameln, 17.05.2021

APPENDIX D – OPERATIONAL PHASE NOISE SOURCES

P5339-ES01 Rev 1

Lenzing, Grimsby
EQUIPMENT SCHEDULE

Aquabio

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	MAIN EFFLUENT													
E104	1	Main Effluent Auto-Sampler	Automatic sampling of raw effluent	Duty only	Automatic refrigerated 24 composite sampler	N/A	N/A	N/A	N/A	Manufacturer's standard	Sirus	40	12	N
	X-LINKER EFFLUENT													
P100A/B	2	X-Linker Effluent Pumps	Transfer of X-Linker influent wastewater from collection sump to DAF System	Duty / standby	Submersible centrifugal	Variable speed	45 m^3/hr	2.0 bar	N/A	TBC		40	24	N
	DAF SYSTEM (X_LINKER EFFLUENT ONLY)													
T105	1	Pre-DAF Balance Tank	Quality and flow balancing of XLinker Effluent prior to DAF treatment	Duty	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	500m^3 volume to TWL 9.4m dia x 7.7m high	TRIFUSION glass coated mild steel **Coated concrete base by others** GRP roof	Permastore	0	24	N
A105A/B	2	Pre-DAF Tank Mixing / Aeration Manifolds	Aeration/mixing of Pre-DAF Balance Tank	Duty / duty	Mixing / aeration manifold, self entraining	N/A	133 m^3/hr	1.6 bar	N/A	316 stainless steel manifold	Aquabio	0	24	N
P105A/B	2	Pre-DAF Balance Tank Mixing Pumps	Liquid motive for Pre-DAF Tank mixing/aeration system	Duty / duty	End suction dry mounted centrifugal pump	Fixed speed	133 m^3/hr	1.6 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	75	24	N
P101A/B	2	DAF Feed Pumps	Transfer of effluent from Balance Tank to DAF System	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	45.0 m^3/hr	1.0 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	71	24	N
T101	1	Chemical/Flocculation Tanks	Mixing chambers for pH correction chemicals, coagulant and flocculant into DAF feed to chemically condition prior to the DAF System	Duty only	Open topped tank	N/A	45.0 m^3/hr	N/A	N/A	316 Stainless steel	Redox	**0**	**24**	N
M101/2/3	3	Mixer/Flocculators	Mixing of pH correction chemicals, coagulant and flocculant into DAF feed to chemically condition prior to the DAF System	Duty only	Top entry propeller mixer/flocculators	Fixed and Variable speed	N/A	N/A	N/A	Stainless steel	Redox	**50**	**24**	N
T102	1	DAF Tank and associated equipment	Separation of solids, FOG and COD prior to biological system	Duty only	Dissolved air flotation unit	N/A	45.0 m^3/hr	N/A	N/A	316 stainless steel **Galvanised mild steel access platform**	Redox	0	24	N
E101	1	DAF Scraper	Removal of floating sludge to sludge hopper	Duty only	Chain driven surface scraper	Variable speed	N/A	N/A	N/A	Plastic chain and flights	Redox standard supply	50	24	N
E102	1	DAF Bottom Auger	Removal of settled sludge from DAF tank	Duty only	Shaftless screw auger	Fixed speed	N/A	N/A	N/A	316 Stainless steel	Redox standard supply	40	24	N
P102A/B	2	DAF Recirculation Pumps	Recycling of DAF effluent to produce 'whitewater'	Duty / standby	End suction dry mounted centrifugal pump	Fixed speed	TBA	TBA	N/A	Cast iron body Stainless steel impeller	Redox standard supply	71	24	N
P103A/B	2	DAF Sludge Pumps	Transfer of DAF sludge to Sludge Tank	Duty / standby	Progressive cavity pump	Fixed speed	10.0 m^3/hr	2.0 bar	N/A	Cast iron body Tool steel rotor Nitrile stator	Seepex	71	12	N
T102	1	DAF Effluent Tank	Collection of DAF treated effluent for transfer to Inlet Screen	Duty	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	10.0m^3 volume to TWL 1.9m dia x 3.0m high	Polypropylene	Flockton TVP	0	24	N
P104A/B	2	DAF Effluent Transfer Pumps	Transfer of DAF effluent to inlet screen	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	45.0 m^3/hr	1.0 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	71	24	N
E101	1	DAF Effluent Auto-Sampler	Automatic sampling of DAF effluent	Duty only	Automatic refrigerated 24 composite sampler	N/A	N/A	N/A	N/A	Manufacturer's standard	Sirus	40	12	N

Lanzing, Grimsby
EQUIPMENT SCHEDULE

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	DAF SYSTEM - CHEMICAL STORAGE AND DOSING													
T1101	1	Bulk Coagulant Storage Tank	Storage of coagulant solution	Duty only	Vertical cylindrical tank with integral bund	N/A	N/A	N/A	30m³ volume to TWL 3.0m dia x 4.5m side wall	GRP	Flocton TVP	0	24	N
P1101	1	DAF Coagulant Dosing Pump	Dosing of coagulant to DAF feed for chemical conditioning	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
P1102	1	Bioreactor Coagulant Dosing Pump	Dosing of coagulant to Bioreactor for chemical conditioning (phosphate control)	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
T1201	1	Bulk Caustic Storage Tank	Storage of caustic solution	Duty only	Vertical cylindrical tank with integral bund	N/A	N/A	N/A	30m³ volume to TWL 3.0m dia x 4.5m side wall	GRP	Flocton TVP	0	24	N
P1201	1	DAF Caustic Dosing Pump	Dosing of caustic to DAF feed for pH correction	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
P1202	1	Bioreactor Caustic Dosing Pump	Dosing of caustic to Bioreactor feed for pH correction	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
T1301	1	Bulk Acid Storage Tank	Storage of acid solution	Duty only	Vertical cylindrical tank with integral bund	N/A	N/A	N/A	30m³ volume to TWL 3.0m dia x 4.5m side wall	GRP	Flocton TVP	0	24	N
P1301	1	DAF Acid Dosing Pump	Dosing of acid to DAF feed for pH correction	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
T1001	1	DAF Neat Poly Supply Tank	Storage of neat polyelectrolyte solution	Duty only	IBC	N/A	N/A	N/A	1.0 m³ working volume	Chemical supplier specification	n/a	0	24	N
TBC	1	Polymer Storage Bund	Bunding for polymer storage	Duty only	IBC bund stand	N/A	N/A	N/A	N/A	Materials to suit chemical, to be specified by bund supplier	Sui Generis	0	24	Y
E1001	1	DAF Poly Make-Up Unit	Make-up of polyelectrolyte solution	Duty only	Liquid polymer make-up unit	Fixed speed	TBA	TBA	N/A	Supplier's standard specification	Water Process Solutions	51	12	Y
T1002	1	DAF Poly Make-Up Tank	Storage and aging of made-up polyelectrolyte solution	Duty only	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	200 litres	Polypropylene	Grundfos	0	24	Y
M1001	1	DAF Poly Make-Up Tank Mixer	Mixing of poly make-up tank	Duty only	Top entry mixer	Fixed speed	N/A	N/A	N/S	Stainless steel wetted parts	Grundfos	40	24	Y
P1001	1	DAF Poly Dosing Pump	Dosing of poly to DAF feed for chemical conditioning	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
	SCREENING & BALANCING (COMBINED EFFLUENT)													
S101	1	Inlet Screen	Inlet screening prior to Balancing Tank	Duty only	Rotary drum screen	Fixed speed	109 m³/hr	N/A	N/A	316 stainless steel Galvanised mild steel access platform	Reko	70	24	N
S102	1	Screen Bypass Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	109 m³/hr	1.5 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	0	N
T201	1	Balance Tank 1	Quality and flow balancing of raw effluent prior to further balancing	Duty only	Vertical cylindrical, open topped sectional steel tank	N/A	N/A	N/A	2547m³ volume to TWL 20.5m dia x 8.5m side wall	TRIFUSION glass coated mild steel **Coated oonorete base by others** GRP roof	Permastore	0	24	N
A201A/B	2	Balance Tank 1 Mixing / Aeration Manifolds	Aeration/mixing of Balance Tank 1	Duty / duty	Mixing / aeration manifold, self entraining	N/A	284 m³/hr	1.5 bar	N/A	316 stainless steel manifold	Aquablo	0	24	N
P201A/B	2	Balance Tank 1 Mixer Pumps	Liquid motive for Balance Tank 1 mixer system	Duty / duty	End suction dry mounted centrifugal pump	Fixed speed	TBC m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
P205A/B	2	Balance Tank 1 Aeration Pumps	Liquid motive for Balance Tank 1 aeration system	Duty / assist	End suction dry mounted centrifugal pump	Fixed speed	284 m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
P203A/B	2	Balance Tank 2 Feed Pumps	Transfer of balanced effluent from Balance Tank 1 to Balance Tank 2	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	109 m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	67	24	N
T202	1	Balance Tank 2	Quality and flow balancing of raw effluent prior to biological treatment	Duty only	Vertical cylindrical, open topped sectional steel tank	N/A	N/A	N/A	2547m³ volume to TWL 20.5m dia x 8.5m side wall	TRIFUSION glass coated mild steel **Coated oonorete base by others** GRP roof	Permastore	0	24	N
A202A/B	4	Balance Tank 2 Mixing / Aeration Manifolds	Aeration/mixing of Balance Tank 2	Duty / duty	Mixing / aeration manifold, self entraining	N/A	284 m³/hr	1.5 bar	N/A	316 stainless steel manifold	Aquablo	0	24	N
P202A/B	2	Balance Tank 2 Mixer Pumps	Liquid motive for Balance Tank 2 mixer system	Duty / duty	End suction dry mounted centrifugal pump	Fixed speed	TBC m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
P206A/B	2	Balance Tank 2 Aeration Pumps	Liquid motive for Balance Tank 2 aeration system	Duty / assist	End suction dry mounted centrifugal pump	Fixed speed	284 m³/hr					67	24	N
P204A/B	2	Anoxic Tank Feed Pumps	Transfer of balanced effluent from Balance Tank 2 to Anoxic Tank 1	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	109 m³/hr	1.0 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	67	24	N

Lenzing, Grimsby
EQUIPMENT SCHEDULE

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	AMBR LE AEROBIC BIOLOGICAL TREATMENT													
T301	1	Anoxic Tank 1	Anoxic biological treatment	Duty only	Vertical cylindrical, open topped sectional steel tank	N/A	N/A	N/A	4946m³ volume to TWL 29.0m dia x 8.5m side wall	TRIFUSION glass coated mild steel **Coated concrete base by others**	Permastore	0	24	N
A301A/B	1	Anoxic Tank 1 Mixing Manifolds	Mixing of Anoxic Tank 1	Duty / duty	Slot type, mixing / aeration manifold, blower assisted	N/A	727.0 m³/hr	N/A	N/A	FRP manifold with GRP injectors 316 stainless steel supports	KLa Systems	0	24	N
P301A/B	2	Anoxic Tank 1 Mixing Aeration Pumps	Liquid motive for Anoxic Tank 1 mixing system	Duty / duty	End suction dry mounted centrifugal pump	Fixed speed	727.0 m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
P304A/B	2	Anoxic Tank 2 Feed Pumps	Transfer of biomass to Anoxic Tank 2	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	280.0 m³/hr	0.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	67	24	N
T302	1	Anoxic Tank 2	Anoxic biological treatment	Duty only	Vertical cylindrical, open topped sectional steel tank	N/A	N/A	N/A	4946m³ volume to TWL 29.0m dia x 8.5m side wall	TRIFUSION glass coated mild steel **Coated concrete base by others**	Permastore	0	24	N
A302A/B	2	Anoxic Tank 2 Mixing / Aeration Manifolds	Aeration/mixing of Anoxic Tank 2	Duty / duty	Slot type, mixing / aeration manifold, blower assisted	N/A	727.0 m³/hr	N/A	N/A	FRP manifold with GRP injectors 316 stainless steel supports	KLa Systems	0	24	N
P302A/B	2	Anoxic Tank 2 Mixing Aeration Pumps	Liquid motive for Anoxic Tank 2 aeration system	Duty / duty	End suction dry mounted centrifugal pump	Fixed speed	727.0 m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
P305A/B	2	Bioreactor Feed Pumps	Transfer of biomass to Bioreactor Tank	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	435.0 m³/hr	0.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	67	24	N
T303	1	Bioreactor Tank	Aerobic biological treatment	Duty only	Vertical cylindrical, open topped sectional steel tank	N/A	N/A	N/A	4946m³ volume to TWL 29.0m dia x 8.5m side wall	TRIFUSION glass coated mild steel **Coated concrete base by others**	Permastore	0	24	N
A303A/B	2	Bioreactor Tank Mixing / Aeration Manifold	Aeration of Bioreactor	Duty / duty	Slot type, mixing / aeration manifold, blower assisted	N/A	727.0 m³/hr	TBA	N/A	FRP manifold with GRP injectors 316 stainless steel supports	KLa Systems	0	24	N
P303A/B/C/D	4	Bioreactor Aerator Pumps	Liquid motive for Bioreactor Tank aeration system	Duty / standby per aerator manifold	End suction dry mounted centrifugal pump	Fixed speed	727.0 m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
B301A/B	3	Air Blowers	Air supply for Bioreactor Tank aeration system	Duty / assist / assist	Positive displacement blower, v-belt driven	Variable speed	2560 Nm³/h	0.8 bar	N/A	Supplier's standard specification	Aerzen	78	24	N
P306A/B	2	Bioreactor Recycle Pumps	Transfer of biomass to Bioreactor Tank	Duty / standby	End suction dry mounted centrifugal pump	Variable speed	330.0 m³/hr	1.5 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	70	24	N
	NUTRIENT STORAGE AND DOSING													
T1501	1	Nutrient Storage Tank	Storage of nutrient solution	Duty only	IBC	N/A	N/A	N/A	1.0 m³ working volume	Chemical supplier specification		0	24	Y
A1501	1	Nutrient Storage Bund	Bunding for nutrient storage	Duty only	IBC bund stand	N/A	N/A	N/A	N/A	Materials to suit chemical, to be specified by bund supplier	Sui Generis	0	24	Y
P1501/2	2	Nutrient Dosing Pump	Dosing of nutrient solution to Anoxic tanks	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
	ANTIFOAM STORAGE AND DOSING													
T1601	1	Antifoam Storage Tank	Storage of antifoam solution	Duty only	IBC	N/A	N/A	N/A	1.0 m³ working volume	Chemical supplier specification		0	24	Y
A1601	1	Antifoam Storage Bund	Bunding for antifoam storage	Duty only	IBC bund stand	N/A	N/A	N/A	N/A	Materials to suit chemical, to be specified by bund supplier	Sui Generis	0	24	Y
P1601/2	2	Antifoam Dosing Pump	Dosing of antifoam solution to Anoxic tanks	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y

Lenzing, Grimsby
EQUIPMENT SCHEDULE

Aquabio

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	UF MEMBRANE BLOCK M1													
	UF MEMBRANE BANK M1A													
M1A	1	UF Membrane Bank	Separation of treated water (UF permeate) from biomass	Duty only	Cross-flow tubular UF membrane bank	N/A	420 m^3/day permeate flow	N/A	N/A	316 stainless steel pipework Galvanised mild steel frame	Aquabio	0	24	Y
M1A #1 - #8	8	UF Membrane Modules	Separation of treated water (UF permeate) from biomass	Duty only	Tubular UF membrane modules	N/A	N/A	N/A	N/A	PVDF membrane PVC-U housing	Berghof	0	24	Y
M1A-P1	1	Membrane Recirculation Pump	Recirculation of mixed liquor through UF membranes	Duty only	End suction dry mounted centrifugal pump	Variable speed	250 m^3/hr	4.8 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	73	24	Y
M1A-P2	1	Membrane Permeate Pump	Drawing of UF permeate from UF Membrane Banks	Duty only	End suction dry mounted centrifugal pump	Variable speed	20 m^3/hr	0.7 bar	N/A	Cast iron body 316 stainless steel impeller	KSB	64	24	Y
M1A-S1	1	Membrane Feed Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	250 m^3/hr	6.0 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	24	Y
	UF MEMBRANE BANK M1B													
M1B	1	UF Membrane Bank	Separation of treated water (UF permeate) from biomass	Duty only	Cross-flow tubular UF membrane bank	N/A	420 m^3/day permeate flow	N/A	N/A	316 stainless steel pipework Galvanised mild steel frame	Aquabio	0	24	Y
M1B #1 - #8	8	UF Membrane Modules	Separation of treated water (UF permeate) from biomass	Duty only	Tubular UF membrane modules	N/A	N/A	N/A	N/A	PVDF membrane PVC-U housing	Berghof	0	24	Y
M1B-P1	1	Membrane Recirculation Pump	Recirculation of mixed liquor through UF membranes	Duty only	End suction dry mounted centrifugal pump	Variable speed	250 m^3/hr	4.8 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	73	24	Y
M1B-P2	1	Membrane Permeate Pump	Drawing of UF permeate from UF Membrane Banks	Duty only	End suction dry mounted centrifugal pump	Variable speed	20 m^3/hr	0.7 bar	N/A	Cast iron body 316 stainless steel impeller	KSB	64	24	Y
M1B-S1	1	Membrane Feed Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	250 m^3/hr	6.0 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	24	Y
	UF MEMBRANE BANK M1C													
M1C	1	UF Membrane Bank	Separation of treated water (UF permeate) from biomass	Duty only	Cross-flow tubular UF membrane bank	N/A	420 m^3/day permeate flow	N/A	N/A	316 stainless steel pipework Galvanised mild steel frame	Aquabio	0	24	Y
M1C #1 - #8	8	UF Membrane Modules	Separation of treated water (UF permeate) from biomass	Duty only	Tubular UF membrane modules	N/A	N/A	N/A	N/A	PVDF membrane PVC-U housing	Berghof	0	24	Y
M1C-P1	1	Membrane Recirculation Pump	Recirculation of mixed liquor through UF membranes	Duty only	End suction dry mounted centrifugal pump	Variable speed	250 m^3/hr	4.8 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	73	24	Y
M1C-P2	1	Membrane Permeate Pump	Drawing of UF permeate from UF Membrane Banks	Duty only	End suction dry mounted centrifugal pump	Variable speed	20 m^3/hr	0.7 bar	N/A	Cast iron body 316 stainless steel impeller	KSB	64	24	Y
M1C-S1	1	Membrane Feed Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	250 m^3/hr	6.0 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	24	Y
	UF MEMBRANE BANK M1D													
M1D	1	UF Membrane Bank	Separation of treated water (UF permeate) from biomass	Duty only	Cross-flow tubular UF membrane bank	N/A	420 m^3/day permeate flow	N/A	N/A	316 stainless steel pipework Galvanised mild steel frame	Aquabio	0	24	Y
M1D #1 - #8	8	UF Membrane Modules	Separation of treated water (UF permeate) from biomass	Duty only	Tubular UF membrane modules	N/A	N/A	N/A	N/A	PVDF membrane PVC-U housing	Berghof	0	24	Y
M1D-P1	1	Membrane Recirculation Pump	Recirculation of mixed liquor through UF membranes	Duty only	End suction dry mounted centrifugal pump	Variable speed	250 m^3/hr	4.8 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	73	24	Y
M1D-P2	1	Membrane Permeate Pump	Drawing of UF permeate from UF Membrane Banks	Duty only	End suction dry mounted centrifugal pump	Variable speed	20 m^3/hr	0.7 bar	N/A	Cast iron body 316 stainless steel impeller	KSB	64	24	Y
M1D-S1	1	Membrane Feed Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	250 m^3/hr	6.0 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	24	Y

Lenzing, Grimsby
EQUIPMENT SCHEDULE

Aquabio

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	UF BACKFLUSH SYSTEM #1													
M1-P3-1	1	Membrane Backflush Pump	Backflushing of UF membrane modules	Duty only	Progressive cavity pump, variable speed	Variable speed	7.5 m^3/hr	4.0 bar	N/A	Cast iron body Stainless steel rotor Nitrile stator	Seepex	71	2	Y
-	1	Backflush Chemical A Storage Tank	Storage of Backflush Chemical A	Duty only	Carboy	N/A	N/A	N/A	25 litres	Chemical supplier specification		0	24	Y
M1-P4-1	1	Backflush Chemical A Dosing Pump	Dosing of Backflush Chemical A to UF backflush line	Duty only	Diaphragm type dosing pump	Variable speed	30 l/hr	4.0 bar	N/A	Materials to suit chemical	Grundfos/Aldos	51	24	Y
-	1	Backflush Chemical B Storage Tank	Storage of Backflush Chemical B	Duty only	Carboy	N/A	N/A	N/A	25 litres	Chemical supplier specification		0	24	Y
M1-P5-1	1	Backflush Chemical B Dosing Pump	Dosing of Backflush Chemical B to UF backflush line	Duty only	Diaphragm type dosing pump	Variable speed	60 l/hr	4.0 bar	N/A	Materials to suit chemical	Grundfos/Aldos	51	24	Y
M1-E1-1	1	Backflush Static Mixer	Mixing of chemicals into backflush flow	Duty only	Static mixer	N/A	7.5 m^3/hr	4.0 bar	N/A	PVC	Telford Plastics	0	24	Y
	UF BACKFLUSH SYSTEM #2													
M1-P3-2	1	Membrane Backflush Pump	Backflushing of UF membrane modules	Duty only	Progressive cavity pump, variable speed	Variable speed	7.5 m^3/hr	4.0 bar	N/A	Cast iron body Stainless steel rotor Nitrile stator	Seepex	71	2	Y
-	1	Backflush Chemical A Storage Tank	Storage of Backflush Chemical A	Duty only	Carboy	N/A	N/A	N/A	25 litres	Chemical supplier specification		0	24	Y
M1-P4-2	1	Backflush Chemical A Dosing Pump	Dosing of Backflush Chemical A to UF backflush line	Duty only	Diaphragm type dosing pump	Variable speed	30 l/hr	4.0 bar	N/A	Materials to suit chemical	Grundfos/Aldos	51	24	Y
-	1	Backflush Chemical B Storage Tank	Storage of Backflush Chemical B	Duty only	Carboy	N/A	N/A	N/A	25 litres	Chemical supplier specification		0	24	Y
M1-P5-2	1	Backflush Chemical B Dosing Pump	Dosing of Backflush Chemical B to UF backflush line	Duty only	Diaphragm type dosing pump	Variable speed	60 l/hr	4.0 bar	N/A	Materials to suit chemical	Grundfos/Aldos	51	24	Y
M1-E1-2	1	Backflush Static Mixer	Mixing of chemicals into backflush flow	Duty only	Static mixer	N/A	7.5 m^3/hr	4.0 bar	N/A	PVC	Telford Plastics	0	24	Y
	UF MEMBRANE ANCILLARIES													
M1-T1	1	UF Permeate Tank	Collection of UF permeate for Autoflushing and Backflushing	Duty only	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	14.7m^3 volume to TWL 2.5m dia x 3.4m high 3.0m TWL	Polypropylene	Flocldon TVP	0	24	Y
M1-T2	1	UF Cleaning Tank	Storage of flushing water and make-up of cleaning solution for UF Membrane Banks	Duty only	Vertical cylindrical tank with integral roof and sloping base	N/A	N/A	N/A	4.1m^3 volume to TWL 1.9m dia x 1.9m high (1.75m available sidewall) 1.6m TWL	Polypropylene	Flocldon TVP	0	24	Y
M1-T3	1	Clean Water Tank	Storage of towns water for backflushing during Mini-Cleans	Duty only	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	6.1m^3 volume to TWL 1.9m dia x 2.5m high 2.2m TWL	Polypropylene	Flocldon TVP	0	24	Y
M1-H1	1	UF Cleaning Tank Heater	Heating of UF Cleaning Tank	Duty only	Electric immersion heater	N/A	N/A	N/A	N/A	Non-corrodable fluoropolymer	Braude	0	24	Y
-	1	Backflush Chemical A Storage Bund	Bunding for Backflush Chemical A Storage Tank	Duty only	Rectangular drip tray / bund	N/A	N/A	N/A	N/A	Polyethylene		0	24	Y
-	1	Backflush Chemical B Storage Bund	Bunding for Backflush Chemical B Storage Tank	Duty only	Rectangular drip tray / bund	N/A	N/A	N/A	N/A	Polyethylene		0	24	Y

Lenzing, Grimsby
EQUIPMENT SCHEDULE

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	UF MEMBRANE BLOCK M2													
	UF MEMBRANE BANK M2A													
M2A	1	UF Membrane Bank	Separation of treated water (UF permeate) from biomass	Duty only	Cross-flow tubular UF membrane bank	N/A	420 m^3/day permeate flow	N/A	N/A	316 stainless steel pipework Galvanised mild steel frame	Aquablo	0	24	Y
M2A #1 - #8	8	UF Membrane Modules	Separation of treated water (UF permeate) from biomass	Duty only	Tubular UF membrane modules	N/A	N/A	N/A	N/A	PVDF membrane PVC-U housing	Berghof	0	24	Y
M2A-P1	1	Membrane Recirculation Pump	Recirculation of mixed liquor through UF membranes	Duty only	End suction dry mounted centrifugal pump	Variable speed	250 m^3/hr	4.8 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	73	24	Y
M2A-P2	1	Membrane Permeate Pump	Drawing of UF permeate from UF Membrane Banks	Duty only	End suction dry mounted centrifugal pump	Variable speed	20 m^3/hr	0.7 bar	N/A	Cast iron body 316 stainless steel impeller	KSB	64	24	Y
M2A-S1	1	Membrane Feed Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	250 m^3/hr	6.0 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	24	Y
	UF MEMBRANE BANK M2B													
M2B	1	UF Membrane Bank	Separation of treated water (UF permeate) from biomass	Duty only	Cross-flow tubular UF membrane bank	N/A	420 m^3/day permeate flow	N/A	N/A	316 stainless steel pipework Galvanised mild steel frame	Aquablo	0	24	Y
M2B #1 - #8	8	UF Membrane Modules	Separation of treated water (UF permeate) from biomass	Duty only	Tubular UF membrane modules	N/A	N/A	N/A	N/A	PVDF membrane PVC-U housing	Berghof	0	24	Y
M2B-P1	1	Membrane Recirculation Pump	Recirculation of mixed liquor through UF membranes	Duty only	End suction dry mounted centrifugal pump	Variable speed	250 m^3/hr	4.8 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	73	24	Y
M2B-P2	1	Membrane Permeate Pump	Drawing of UF permeate from UF Membrane Banks	Duty only	End suction dry mounted centrifugal pump	Variable speed	20 m^3/hr	0.7 bar	N/A	Cast iron body 316 stainless steel impeller	KSB	64	24	Y
M2B-S1	1	Membrane Feed Basket Strainer	Protection of UF Membrane Systems	Duty only	In-line simplex basket strainer	N/A	250 m^3/hr	6.0 bar	N/A	Cast iron housing 316 filter element	Barton Firtop	0	24	Y
	UF BACKFLUSH SYSTEM #1													
M2-P3-1	1	Membrane Backflush Pump	Backflushing of UF membrane modules	Duty only	Progressive cavity pump, variable speed	Variable speed	7.5 m^3/hr	4.0 bar	N/A	Cast iron body Stainless steel rotor Nitrile stator	Seepex	71	2	Y
-	1	Backflush Chemical A Storage Tank	Storage of Backflush Chemical A	Duty only	Carboy	N/A	N/A	N/A	25 litres	Chemical supplier specification		0	24	Y
M2-P4-1	1	Backflush Chemical A Dosing Pump	Dosing of Backflush Chemical A to UF backflush line	Duty only	Diaphragm type dosing pump	Variable speed	30 l/hr	4.0 bar	N/A	Materials to suit chemical	Grundfos/Alldos	51	24	Y
-	1	Backflush Chemical B Storage Tank	Storage of Backflush Chemical B	Duty only	Carboy	N/A	N/A	N/A	25 litres	Chemical supplier specification		0	24	Y
M2-P5-1	1	Backflush Chemical B Dosing Pump	Dosing of Backflush Chemical B to UF backflush line	Duty only	Diaphragm type dosing pump	Variable speed	60 l/hr	4.0 bar	N/A	Materials to suit chemical	Grundfos/Alldos	51	24	Y
M2-E1-1	1	Backflush Static Mixer	Mixing of chemicals into backflush flow	Duty only	Static mixer	N/A	7.5 m^3/hr	4.0 bar	N/A	PVC	Telford Plastics	0	24	Y
	UF MEMBRANE ANCILLARIES													
M2-T1	1	UF Permeate Tank	Collection of UF permeate for Autoflushing and Backflushing	Duty only	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	14.7m^3 volume to TWL 2.5m dia x 3.4m high 3.0m TWL	Polypropylene	Flocldon TVP	0	24	Y
M2-T2	1	UF Cleaning Tank	Storage of flushing water and make-up of cleaning solution for UF Membrane Banks	Duty only	Vertical cylindrical tank with integral roof and sloping base	N/A	N/A	N/A	4.1m^3 volume to TWL 1.9m dia x 1.9m high (1.75m available sidewall) 1.5m TWL	Polypropylene	Flocldon TVP	0	24	Y
M2-T3	1	Clean Water Tank	Storage of towns water for backflushing during Mini-Cleans	Duty only	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	6.1m^3 volume to TWL 1.9m dia x 2.5m high 2.2m TWL	Polypropylene	Flocldon TVP	0	24	Y
M2-H1	1	UF Cleaning Tank Heater	Heating of UF Cleaning Tank	Duty only	Electric immersion heater	N/A	N/A	N/A	N/A	Non-corrodable fluoropolymer	Braude	0	24	Y

Lenzing, Grimsby
EQUIPMENT SCHEDULE

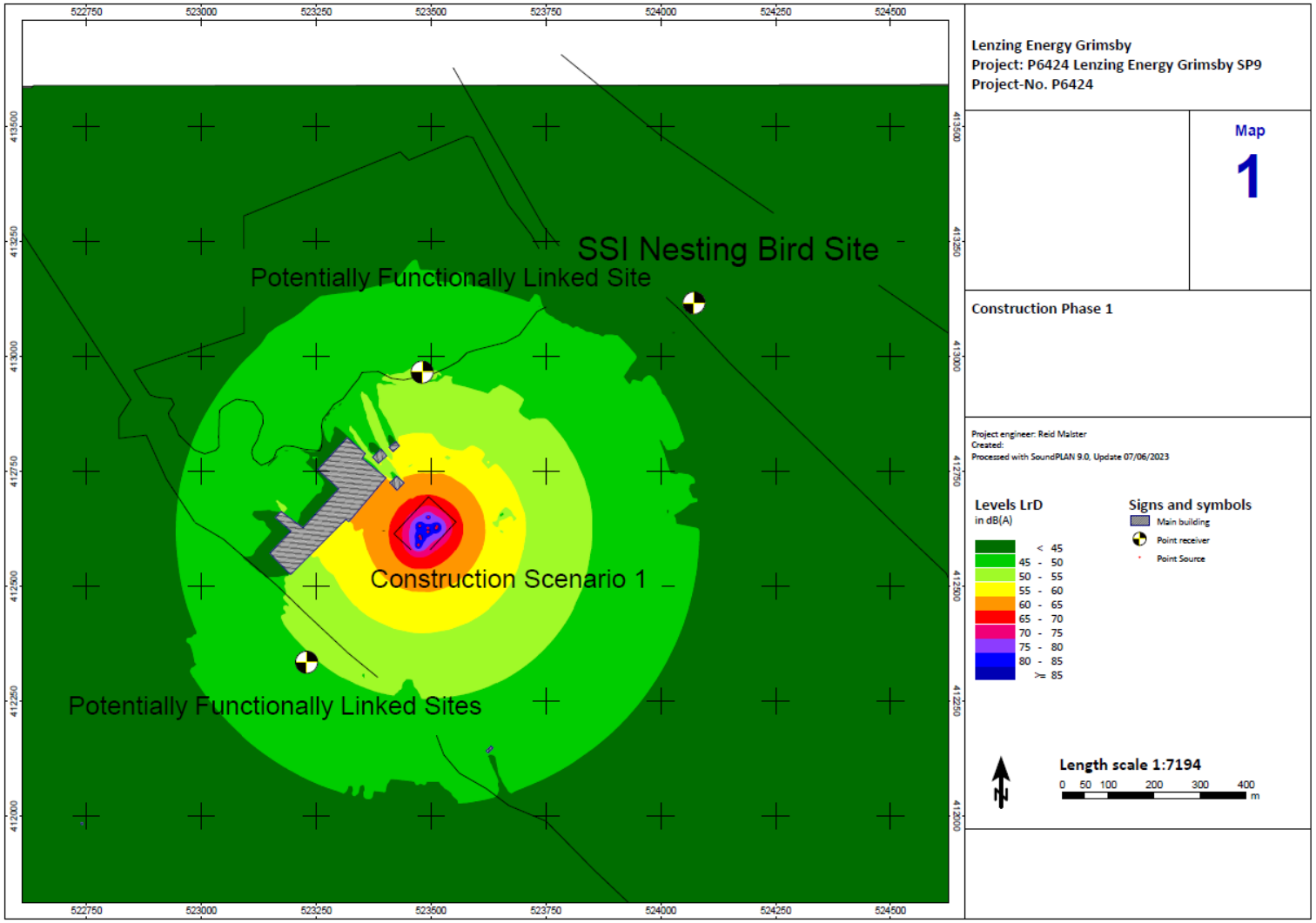
TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	SLUDGE HANDLING													
T701	1	Sludge Storage Tank 1	Storage of DAF sludge	Duty only	Vertical cylindrical sectional steel tank, c/w roof	N/A	N/A	N/A	47m³ volume to TWL 3.4m dia x 5.6m high	TRIFUSION glass coated mild steel **Coated concrete base by others** GRP roof	Permastore	0	24	N
A701	1	Sludge Tank 1 Mixing / Aeration Manifold	Aeration/mixing of Sludge Tank 1	Duty	Mixing / aeration manifold, self entraining	N/A	55 m³/hr	1.6 bar	N/A	316 stainless steel manifold	Aquablo	0	24	N
P701A/B	2	Sludge Tank 1 Mixing Pumps	Liquid motive for Sludge Tank 1 mixing system	Duty / standby	End suction dry mounted centrifugal pump	Fixed speed	55 m³/hr	1.6 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	67	24	N
P703A/B	2	DAF Sludge Transfer Pump	Transfer of sludge to sludge centrifuge	Duty / standby	Progressive cavity pump	Variable speed	20.0 m³/hr	2.0 bar	N/A	Cast iron body Tool steel rotor Nitrile stator	Seepex	71	2	N
T702	1	Sludge Storage Tank 2	Storage of MBR sludge	Duty only	Vertical cylindrical sectional steel tank, c/w roof	N/A	N/A	N/A	107m³ volume to TWL 5.1m dia x 5.6m high	TRIFUSION glass coated mild steel **Coated concrete base by others** GRP roof	Permastore	0	24	N
A702	1	Sludge Tank 2 Mixing / Aeration Manifold	Aeration/mixing of Sludge Tank 1	Duty / standby	Mixing / aeration manifold, self entraining	N/A	55 m³/hr	1.6 bar	N/A	316 stainless steel manifold	Aquablo	0	24	N
P702A/B	2	Sludge Tank 2 Mixing Pumps	Liquid motive for Sludge Tank 2 mixing system	Duty / standby	End suction dry mounted centrifugal pump	Fixed speed	55 m³/hr	1.6 bar	N/A	Cast iron body Duplex stainless steel impeller	KSB	64	24	N
P704A/B	2	MBR Sludge Centrifuge Feed Pumps	Transfer of sludge to sludge centrifuge	Duty / standby	Progressive cavity pump	Variable speed	20.0 m³/hr	2.0 bar	N/A	Cast iron body Tool steel rotor Nitrile stator	Seepex	67	24	N
E701A/B	1	Sludge Centrifuge Unit	Dewatering of DAF/biomass sludge	Duty only	Decanter centrifuge	Variable speed	20.0 m³/hr	N/A	N/A	Stainless steel wetted parts Fiberglass cover Painted carbon steel frame	Andritz	61	12	N
E1401	1	Sludge Neat Poly Supply Tank	Storage of neat polyelectrolyte solution	Duty only	IBC	N/A	N/A	N/A	1.0 m³ working volume	Chemical supplier specification	n/a	0	24	Y
TBC	1	Polymer Storage Bund	Bunding for polymer storage	Duty only	IBC bund stand	N/A	N/A	N/A	N/A	Materials to suit chemical, to be specified by bund supplier	Sui Generis	0	24	Y
E1401	1	Sludge Poly Make-Up Unit	Make-up of polyelectrolyte solution	Duty only	Liquid polymer make-up unit	Fixed speed	TBA	TBA	N/A	Supplier's standard specification	Water Process Solutions	51	12	Y
E1402	1	Sludge Poly Make-Up Tank	Storage and aging of made-up polyelectrolyte solution	Duty only	Vertical cylindrical tank with integral roof	N/A	N/A	N/A	200 litres	Polypropylene	Grundfos	0	24	Y
M1401	1	Sludge Poly Make-Up Tank Mixer	Mixing of poly make-up tank	Duty only	Top entry mixer	Fixed speed	N/A	N/A	N/S	Stainless steel wetted parts	Grundfos	0	24	Y
P1401	1	Sludge Poly Dosing Pump	Dosing of poly to sludge thickener feed for chemical conditioning	Duty only	Digital diaphragm type dosing pump	Variable speed	TBA	TBA	N/A	Materials to suit chemical, to be specified by pump supplier	Grundfos	51	24	Y
	FINAL EFFLUENT													
P501A/B	2	Final Effluent Pumps	Transfer of all final effluent to new Humber discharge point	Duty / standby	Submersible centrifugal	Variable speed	109 m³/hr	2.0 bar	N/A	Cast iron body Stainless steel impeller	KSB	67	24	N
E501	1	Final Effluent Auto-Sampler	Automatic sampling of raw effluent	Duty only	Automatic refrigerated 24 composite sampler	N/A	N/A	N/A	N/A	Manufacturer's standard	Sirus	40	12	N

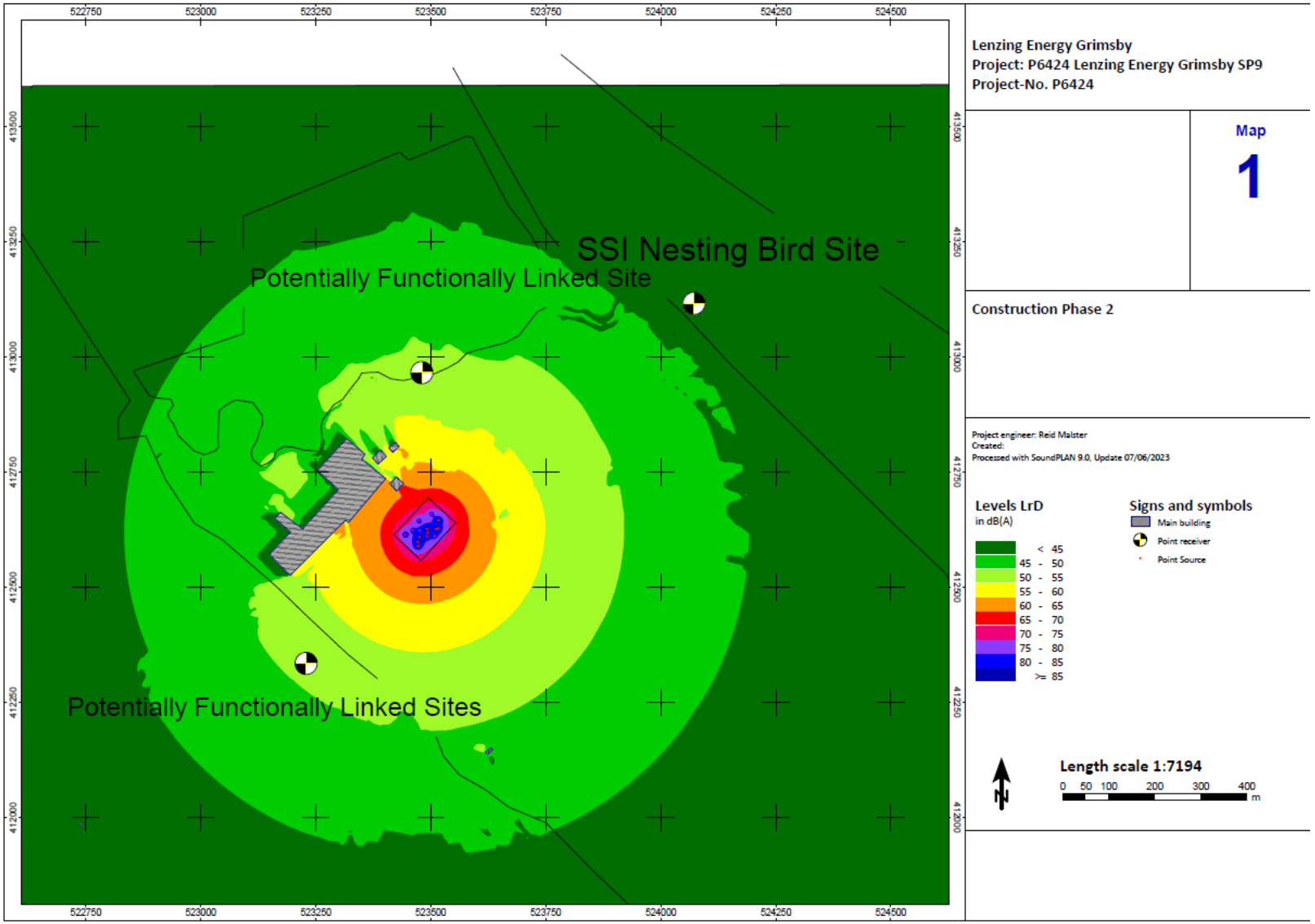
Lenzing, Grimsby
EQUIPMENT SCHEDULE

TAG No.	No.	PLANT DESCRIPTION	FUNCTION	ARRANGEMENT	TYPE	STARTER	DUTY FLOW	DUTY PRESSURE	TANK DIMENSIONS	MATERIALS	MANUFACTURER	PROVISIONAL dBA RATING @1m	OPERATIONAL HOURS/DAY	LOCATED WITHIN A BUILDING OR ENCLOSURE
	GENERAL													
P801A/B	2	Drainage Return Pumps	Transfer of process drainage from collection sump to inlet screen	Duty / standby	Submersible centrifugal	Fixed speed	20.0 m^3/hr	1.0 bar	N/A	Cast iron body Stainless steel impeller	KSB	40	24	N
C1701A/B	2	Compressors	Provision of compressed air for pneumatic duties	Duty / standby	Rotary screw compressors	Fixed speed	TBA	TBA	N/A	Supplier's standard specification	TBC	70	24	Y
E1701	1	Compressed Air Receiver	Collection of compressed air	Duty only	Vertical air receiver	N/A	N/A	N/A	TBA	Supplier's standard specification	Kaeser	0	24	Y
E1702	1	Auto Condensate Drain	Automatic release of condensate from air receiver	Duty only	Electronic condensate drain valve	N/A	TBA	TBA	N/A	Supplier's standard specification	Bekomat Technologies	0	24	Y
E1703	1	Dryer	Drying of compressed air	Duty only	Dessicant air dryer	N/A	TBA	TBA	N/A	Supplier's standard specification	HPC	0	24	Y
E1704	1	Oil/Water Separator	Separation of oil from compressed air condensate	Duty only	Oil/Water Separator	N/A	TBA	TBA	N/A	Supplier's standard specification	HPC	0	24	Y
-	1	Pre-Dryer Oil Removal Filter	Removal of oil prior to dryer	Duty only	High Efficiency Oil Removal Filter	N/A	TBA	TBA	N/A	Supplier's standard specification	HPC	0	24	Y
-	1	Dryer Bypass Oil Removal Filter	Removal of oil in dryer bypass	Duty only	High Efficiency Oil Removal Filter	N/A	TBA	TBA	N/A	Supplier's standard specification	HPC	0	24	Y
-	1	Post-Dryer Dust Removal Filter	Removal of dust particles after dryer	Duty only	Dust Removal Filter	N/A	TBA	TBA	N/A	Supplier's standard specification	HPC	0	24	Y
-	1	Post-Dryer Oil Removal Filter	Removal of oil after dryer	Duty only	High Efficiency Oil Removal Filter	N/A	TBA	TBA	N/A	Supplier's standard specification	HPC	0	24	Y
E1801	1	Washwater Booster Set	Provision of washwater to screens	Duty only	Water booster set including dry mounted, multi-stage centrifugal pumps	Fixed speed	TBA	TBA	N/A	Supplier's standard specification	G M Treble	60	12	Y
-	2	Safety Shower / Eyewash Unit	Emergency shower and eyewash unit	Duty only	Free standing emergency shower with eyewash unit	N/A	N/A	N/A	N/A	Supplier's standard specification	Emergency Shower Co	0	24	Y
-	8	Hose Reels	Hosing down	N/A	Retractible hose reel	N/A	N/A	N/A	N/A	Supplier's standard specification	Hoses Direct	0	24	Y

Notes:
1. Where Manufacturer is advised Aquabio may select an alternative supplier at the time of detailed design
2. All equipment is installed with appropriate isolation valves
3. Please refer to instrument schedule for details of associated instrumention

APPENDIX E – NOISE MODELLING RESULTS

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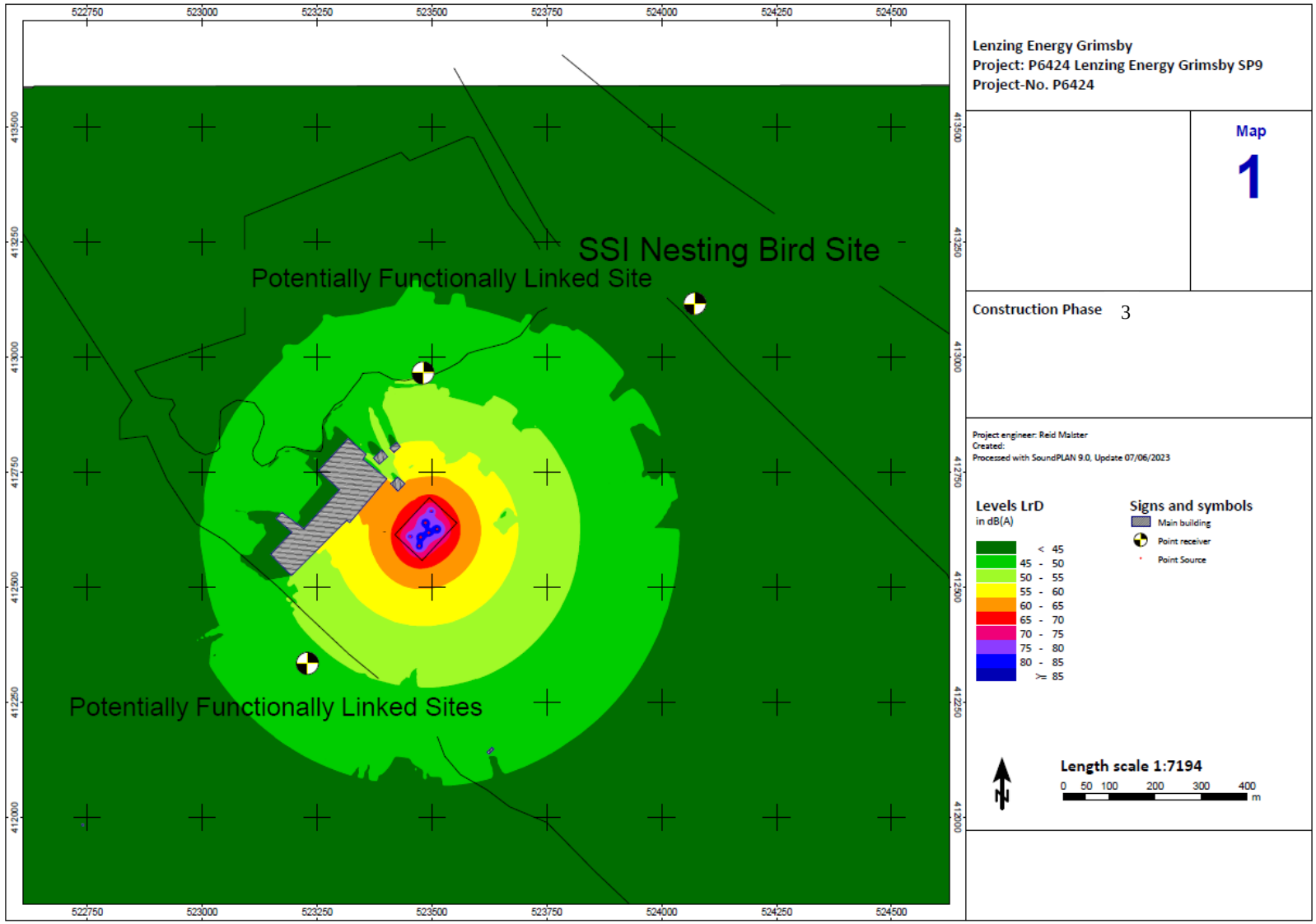
523250
523500
523750
524000
524250
524500
413500
413250
413000
412750
412500
412250
412000
SSI Nesting Bird Site
Potentially Functionally Linked Site
Potentially Functionally Linked Sites
Lenzing Energy Grimsby
Project: P6424 Lenzing Energy Grimsby SP9
Project-No. P6424
Map
1
Construction Phase 2
Project engineer: Reid Malster
Created:
Processed with SoundPLAN 9.0, Update 07/06/2023
Levels LrD
in dB(A)
< 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
>= 85
Signs and symbols
Main building
Point receiver
Point Source
N
Length scale 1:7194
0 50 100 200 300 400
m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523500
523750
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524250
524500
413500
413250
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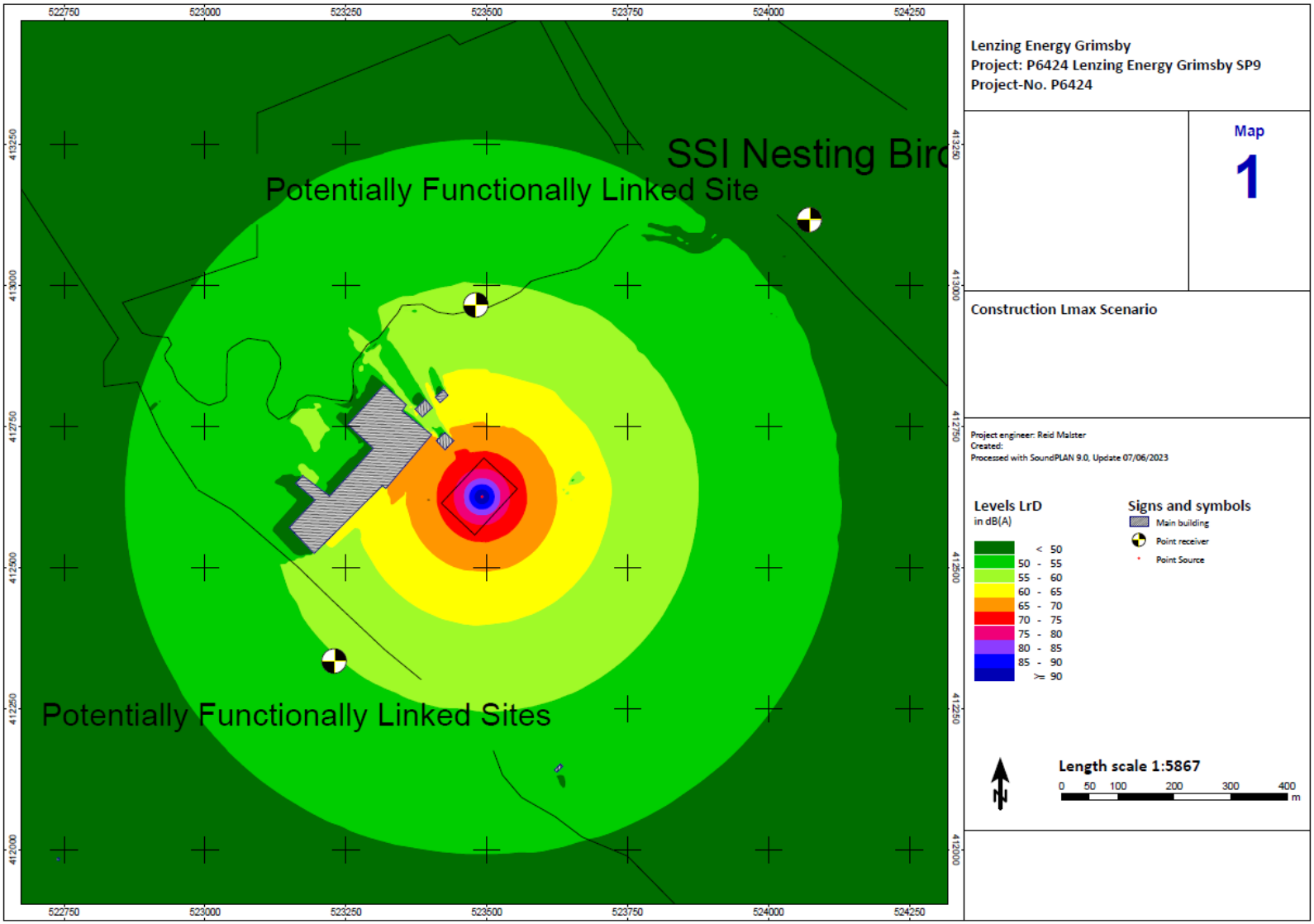
412750
412500
412250
412000
SSI Nesting Bird Site
Potentially Functionally Linked Site
Potentially Functionally Linked Sites
Lenzing Energy Grimsby
Project: P6424 Lenzing Energy Grimsby SP9
Project-No. P6424
Map
1
Construction Phase 3
Project engineer: Reid Malster
Created:
Processed with SoundPLAN 9.0, Update 07/06/2023
Levels LrD
in dB(A)
< 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
>= 85
Signs and symbols
Main building
Point receiver
Point Source
N
Length scale 1:7194
0 50 100 200 300 400
m


522750
523000
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523500
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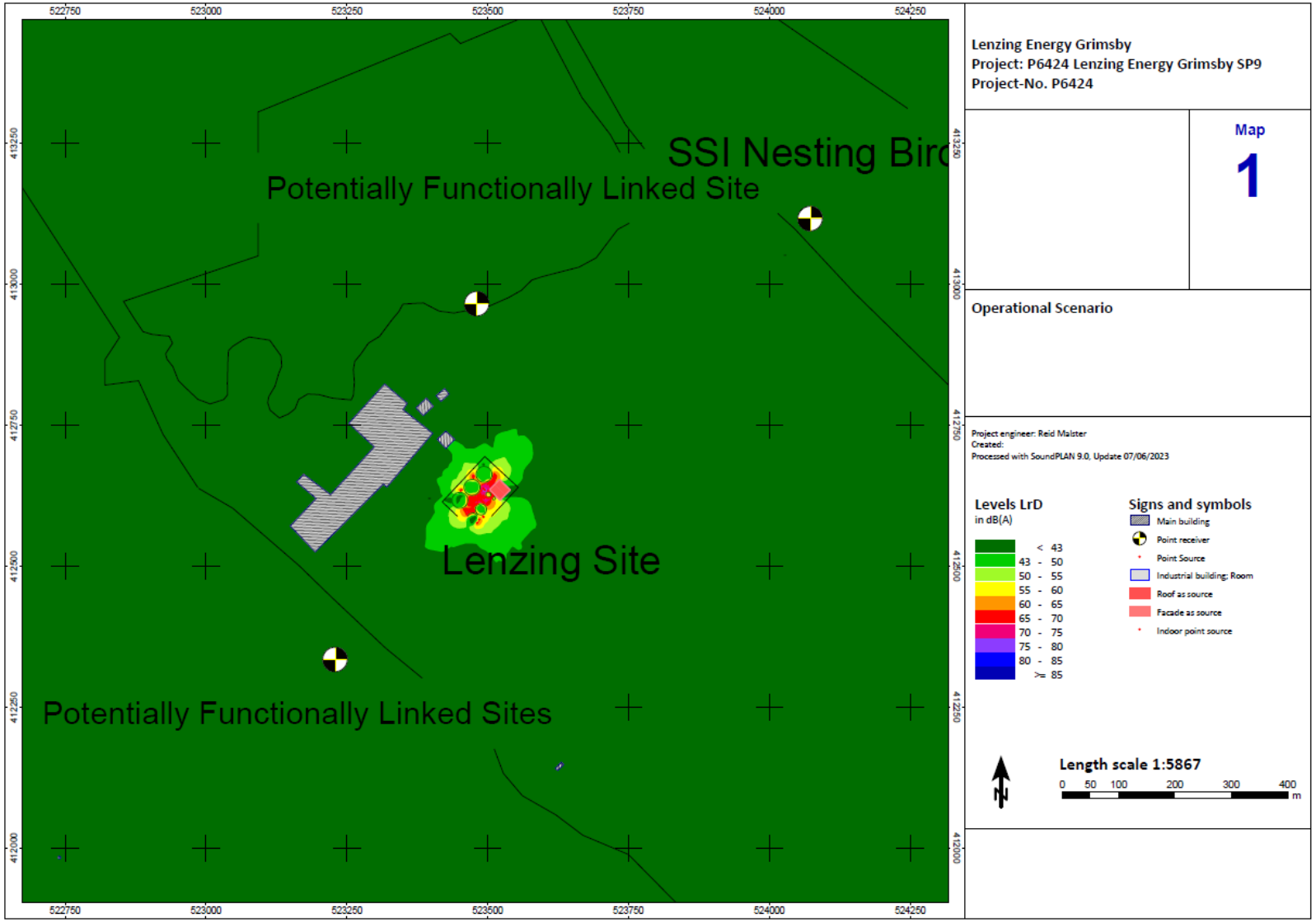
524000
524250
413250
413000
412750
412500
412250
412000
SSI Nesting Bird
Potentially Functionally Linked Site
Potentially Functionally Linked Sites
Lenzing Energy Grimsby
Project: P6424 Lenzing Energy Grimsby SP9
Project-No. P6424
Map
1
Construction Lmax Scenario
Project engineer: Reid Malster
Created:
Processed with SoundPLAN 9.0, Update 07/06/2023
Levels LrD
in dB(A)
< 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
85 - 90
>= 90
Signs and symbols
Main building
Point receiver
Point Source
N
Length scale 1:5867
0 50 100 200 300 400
m


522750
523000
523250
523500
523750
524000
524250
413250
413000
412750
412500
412250
412000
SSI Nesting Bird
Potentially Functionally Linked Site
Lenzing Site
Potentially Functionally Linked Sites
Lenzing Energy Grimsby
Project: P6424 Lenzing Energy Grimsby SP9
Project-No. P6424
Map
1
Operational Scenario
Project engineer: Reid Malster
Created:
Processed with SoundPLAN 9.0, Update 07/06/2023
Levels LrD
in dB(A)
< 43
43 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
>= 85
Signs and symbols
Main building
Point receiver
Point Source
Industrial building; Room
Roof as source
Facade as source
Indoor point source
N
Length scale 1:5867
0 50 100 200 300 400
m

APPENDIX F - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. *NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.*
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. *NOTE: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T *NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound	Underlying level of sound over a period, *T*, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$) to provide a weighting against low frequency performance. *NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.*
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m2), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. *NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.*
Free-field level	Sound pressure level away from reflecting surfaces. *NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.*

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. *NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.*
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. *NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. *NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.*
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for *N*% of a specified time interval.
Reference time interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. *NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.*
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Rating level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. *NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.*
Reverberation time, *T*	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, *L*AE	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, *D*	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, *p*	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, *R*	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source (BS 4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. *NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.*
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. *NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.*
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. *NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).*
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
$L_{Ar,Tr}$	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$LAeq,T$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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