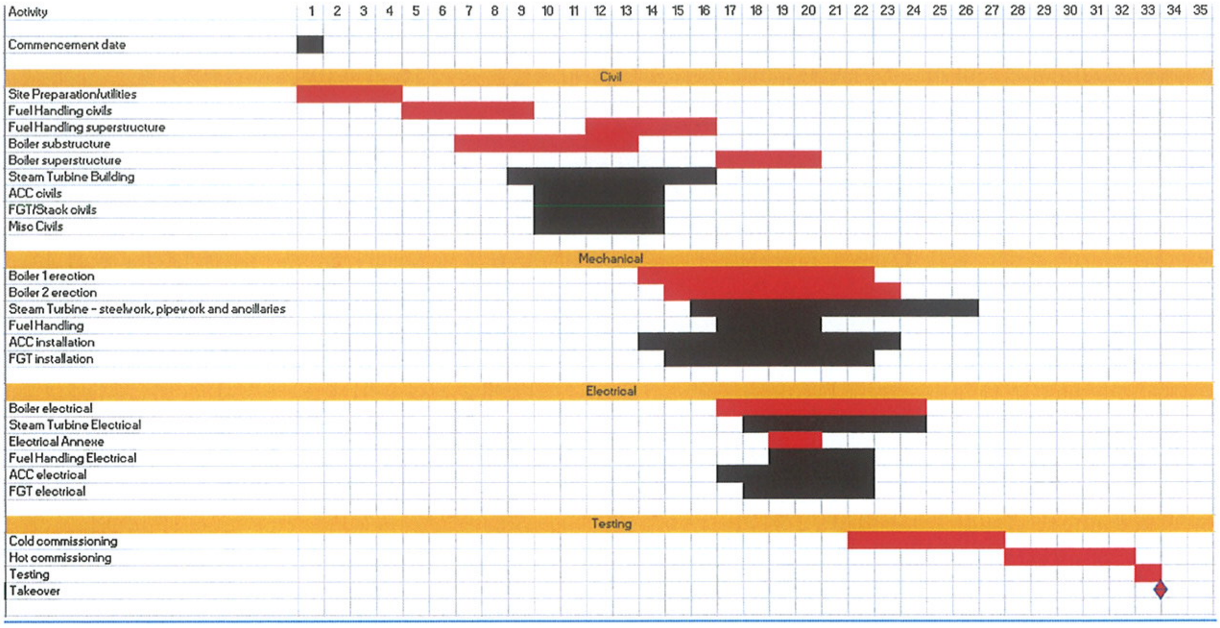
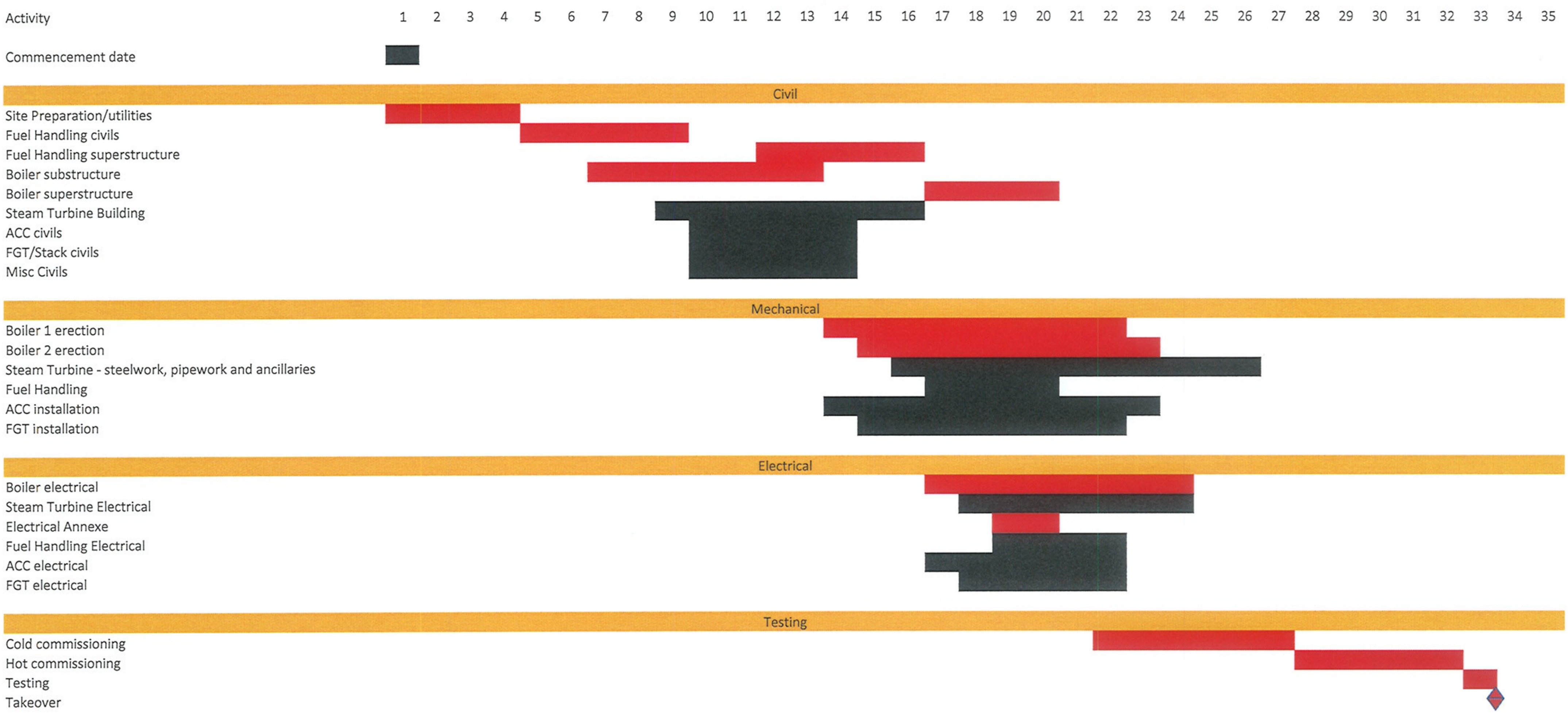
Appendix 21 Project timetable

Construction of the Hooton Bio Power facility has commenced October 2018 with completion expected within ca 36 months





Activity
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Commencement date
Civil
Site Preparation/utilities
Fuel Handling civils
Fuel Handling superstructure
Boiler substructure
Boiler superstructure
Steam Turbine Building
ACC civils
FGT/Stack civils
Misc Civils
Mechanical
Boiler 1 erection
Boiler 2 erection
Steam Turbine - steelwork, pipework and ancillaries
Fuel Handling
ACC installation
FGT installation
Electrical
Boiler electrical
Steam Turbine Electrical
Electrical Annexe
Fuel Handling Electrical
ACC electrical
FGT electrical
Testing
Cold commissioning
Hot commissioning
Testing
Takeover

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REPORT

Hooton Bio Power Ltd

WRATE Analysis

Client: Hooton Bio Power Ltd

Reference: PB6948IBRP1812031158

Revision: 001/Final

Date: 03 December 2018

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Project name:	Hooton Bio Power Ltd
Project number:	PB6948
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Date / initials:	03.12.18
Approved by:	B Harding
Date / initials:	03.12.18

Classification
Project related

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Appendices

Executive Summary

We were requested to perform a WRATE life-cycle assessment (LCA), including user-defined processes to represent the Hooton Park gasification development, using the Kobelco technology. WRATE is an acronym for Waste & Resources Assessment Tool for the Environment, which is a bespoke Life Cycle Assessment (LCA) tool developed by the Environment Agency for determining the impact of waste management processes. The WRATE LCA has been performed by a trained consultant, using the latest version of the WRATE model, version 4.0.1.0.

The WRATE modelling is being undertaken to identify the project's carbon impacts. The WRATE model has applied two techniques to consider the carbon saved from the energy recovery process. Firstly, by applying the methodology set out in the latest Green Investment Group (October 2017) bespoke guidance to the assessment of thermal processes using WRATE, and secondly by applying the relevant WRATE default background energy mix. A comparator against landfill of the feedstock (waste) material was also included and the key results are shown in Table 1.

Table 1 WRATE assessment outputs illustrating the results of the modelling exercise

	Hooton Park Scenario impacts	Kg of CO_2 saved / kwh exported (net)	Landfill comparator	Total Savings versus Landfill
Hooton Park Model with CCGT Marginal Energy Mix (Green Investment Group)	-11,827,275 kg CO_2 eq, (saved)	0.114	70,701,424 kg CO_2 eq impact	82,528,699 kg CO_2 eq per annum
Comparison against WRATE default Energy Mix	-39,066,635 kg CO_2 eq (saved)	0.199	65,347,660 kg CO_2 eq impact	104,414,295 kg CO_2 eq per annum

The model used data obtained during the technical due diligence process and, where gaps existed, the model was completed using the defaults available within WRATE for the Energos 4 Line Gasification Process [ID 21836] as a peer reviewed proxy technology. The project year was set as 2022.

The findings show a CO_2 equivalent saving of the Hooton Park gasification operation of between 82,528 to 104,414 tonnes of CO_2 equivalent impact per annum compared to landfilling the waste. This saving is equivalent to the annual CO_2 emissions from 42,381 to 53,620 cars[1]. This benefit is primarily derived from the energy recovery, recycling (of metals from the process residue) and avoided methane (that is generated by the landfill alternative).

The carbon benefit of the electricity generated and exported is also sensitive to the modelling approach undertaken. Using the Green Investment Group methodology of defining the marginal energy mix as 100% CCGT[2] generation, the Hooton Park development saves 114kg of CO_2 equivalent / MWh (net) electricity generated. If applying the standard WRATE assumptions this would save 199kg of CO_2

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[1] Based on emissions from the average new car from Society of Motor Manufacturers and Traders, and assuming a 10,000 mile per annum average mileage
[2] Combined Cycle Gas Turbine generation – i.e. comparing to an efficient Gas Power station at 52.9% generating efficiency. Source: Green Investment Group, Green Impact Reporting Criteria, Appendix 3, October 2017

equivalent / MWh (net) generated. These approaches take account of the embedded carbon in constructing the facility and managing / transporting the outputs.

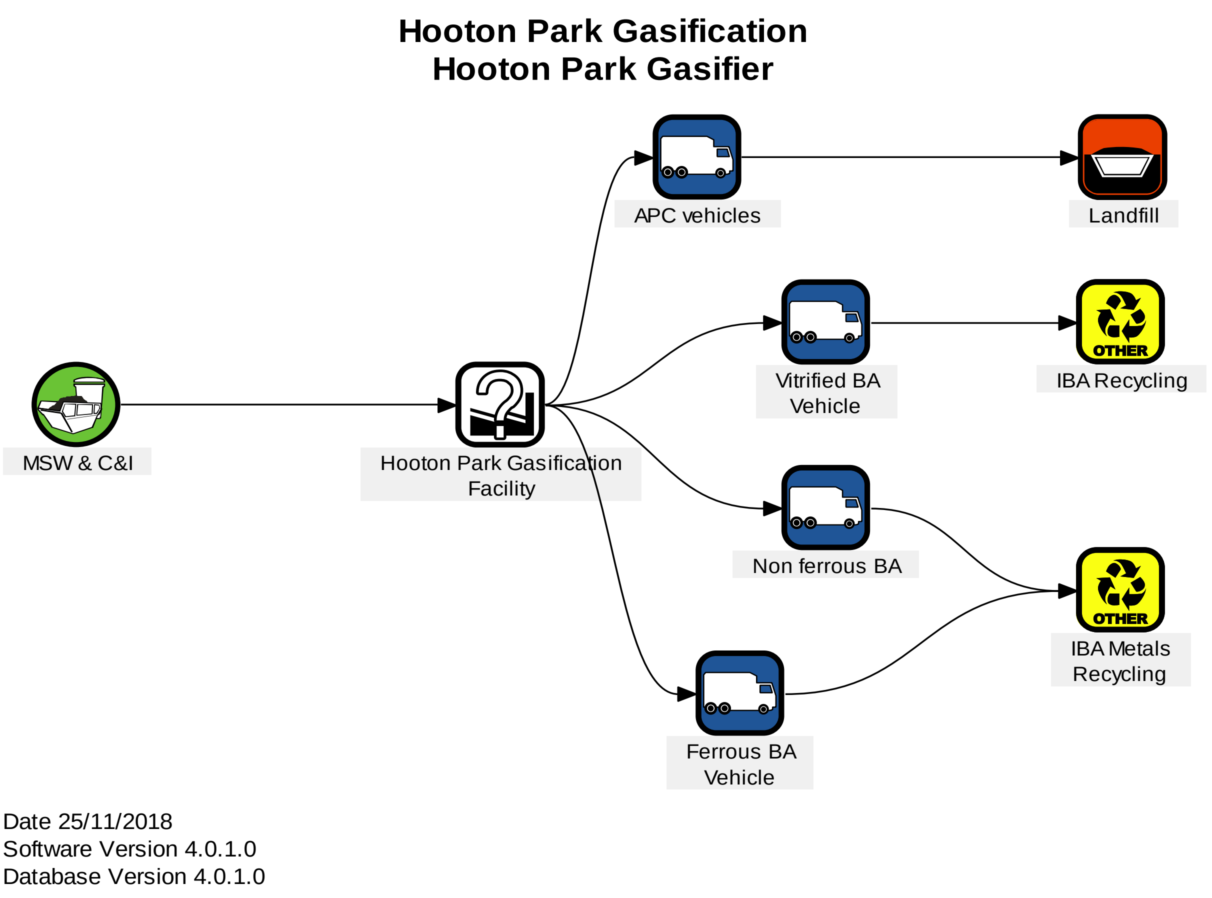
1 The WRATE Modelling Parameters

The project year modelled in WRATE is 2022; for the default WRATE methodology all standard electricity mixes for 2022 were applied, however, a second approach was also adopted in accordance with the Green Investment Group guidance, where a bespoke electricity marginal mix 100% Gas CCGT was applied for the marginal fuel mix.

The Hooton Park Development

The project is intended to construct and operate a gasification process, using the Kobelco technology to accept c. 247,000tpa of municipal and commercial waste through a gasification facility. The WRATE scenario map of the proposal can be seen in Figure 1 below.

Figure 1 Hooton Park project WRATE scenario schematic



All assumptions made in the development of this model are included in the following sections. The outputs of Gasification residue, referenced as Bottom Ash (BA) in the model, and metals are transported a nominal 50km and recycled. The Air Pollution Control residues (APC) are also transported a nominal 50km and then landfilled. Onward waste transport is modelled using the WRATE *Intermodal Road Transport v2 (12026)* process.

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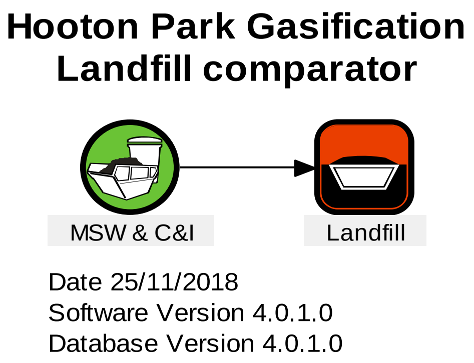
The Baseline Comparator Scenario

A baseline scenario was developed for the same waste stream, illustrated in Figure 2, using a landfill (Clay liner and cap, process ID 12255) as a comparator.

Figure 2 Baseline WRATE scenario schematic



Assumptions and Processes in the Hooton Park Scenario

Waste Feedstock

A waste feedstock specification was provided from the project's fuel supply agreement which anticipated a waste stream with a net calorific value of between 9 and 12 MJ / kg, averaging around 10.5 MJ / kg with a moisture content of <30%. The closest waste stream to this in WRATE is the 'co-collected trade waste' which is a mix of commercial and household waste. These are anticipated to be the two main sources of waste and therefore can be considered reflective. It also has a calorific value of 10.11 MJ / kg and a moisture level of 28.2%. This is within the ranges cited and close to the design value and therefore has been applied to the model.

Waste Pre-treatment

There is assumed to be no Waste Pre-Treatment facility because the waste provided to the gasifier arises in suitable form for treatment.

User-Defined Hooton Park Gasification Facility

The default WRATE process *Gasification ENERGOS – 4 Line (*21836*)* was used as the basis for the proposal as this is the most similar process available in WRATE. Using this as a template, a user-defined WRATE process *Hooton Park Gasifier (11349)* was developed. A number of changes were made to reflect the larger capacity of the facility, whilst other changes reflected absolute information provided in the process mass and energy information. The changes are listed in Table 2 below. The process emissions factors are scaled by the allocation rules in WRATE to reflect the size of the facility.

Table 2 User-defined Hooton Park Gasifier Modifications from WRATE Energos Process

Parameter	ENERGOS – 4 Line (21836)	Hooton Park Gasifier (11349)	Reasoning
Land Take (ha)	3.5	1.5	Based on site area.
Waste Recovered (kg)	180,000,000	247,000,000	Derived from mass and energy balance data

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Parameter	ENERGOS – 4 Line (21836)	Hooton Park Gasifier (11349)	Reasoning
Energy Recovered (MJ)	461,798,280	707,616,000	Derived from mass and energy balance data
Construction Material Inputs, Maintenance Material Inputs, Maintenance Material Outputs, Operational Fuel Inputs, Operational Material Inputs, Energy Inputs, Emissions factors	All	Maintained as previous except where stated below	Scaled by allocation rules and incoming waste properties (where relevant).
Operational Material Inputs	As Energos except as noted.	APC and other process inputs amended bespoke to Kobelco: 41t Activated carbon 737t Ammonia 6265t Lime 139t Sodium Hydroxide 108t Hydrochloric Acid 244,840kg of Fuel Oil[3]	Derived from mass and energy balance data
Operational Water Inputs	89,613m^3 of process water	25,400m^3 of process water	Derived from mass and energy balance data
Process Energy Production – Electricity (MJ)	461,798,280	707,616,000	Net process energy production (minus parasitic load)
Process Waste Output (Bottom Ash)	31,350t	16,800t of 'vitrified slag' treated as IBA[4] Plus 6700 further tonnes of IBA & 1736t of non-ferrous and 3656t of ferrous metals	Absolute figure used as supplied in project mass balance. The ferrous and non-ferrous metals are derived from the allocation rules for Incinerators in WRATE and apply a % separation of the input metals within the feedstock.
Process Waste Output (APCr)	7138t	15,540t	Absolute figure used as supplied in project process data.

[3] 294,280 litres of fuel oil converted at 0.832kg/l density
[4] Incinerator Bottom Ash

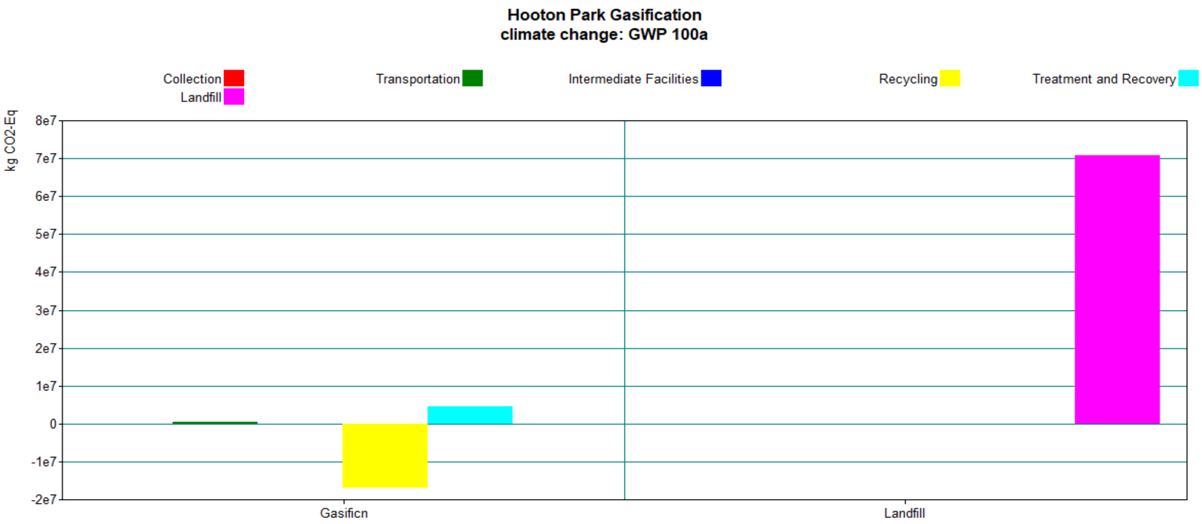
2 Results

The WRATE results show that the facility is modelled to achieve a saving of at least 85,000 tonnes of CO_2 equivalent per annum compared with the landfill option. Where WRATE default electricity mixes are applied the saving rises to c.104,000 tonnes of CO_2 equivalent per annum. The results are illustrated in Table 3 and the carbon balance in Figure 3 below.

Table 3 Comparison of Landfill and Hooton Park WRATE results

	Hooton Park Scenario impacts	Landfill comparator	Total Savings versus Landfill
Hooton Park Model with CCGT Marginal Energy Mix (Green Investment Group)	-11,827,275 kg CO_2 eq, (saved)	70,701,424 kg CO_2 eq impact	82,528,699 kg CO_2 eq per annum
Comparison against WRATE default Energy Mix	-39,066,635 kg CO_2 eq (saved)	65,347,660 kg CO_2 eq impact	104,414,295 kg CO_2 eq per annum

Figure 3 Breakdown of carbon performance (using the Green Investment Group method)



The modelled carbon savings in terms of energy generation are shown in Table 4 overleaf, which shows that between 114kg – 199kg of CO_2 per MWh is saved from the energy generated by the gasification process. These calculations include the carbon burdens of developing and operating the gasification facility and managing the outputs from the process. For clarity, compared to electricity generated from high efficiency combined cycle gas turbine power station sources the Hooton Park generation saves 114kg of CO_2 per MWh exported (net).

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Table 4 Carbon savings of Energy generation from the Hooton Park development

	Kg of CO_2 saved per kwh exported (net) Total Scenario impacts
Hooton Park Model with CCGT Marginal Energy Mix (Green Investment Group)	0.114
Hooton Park Model Comparison against WRATE default Energy Mix	0.199

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Appendices

Table 5 Full set of WRATE results for the Modelling Approach Using the Green Investment Group Marginal Energy Mix

Impact Assessments	Unit	Gasification	Landfill
climate change: GWP 100a	kg CO2-Eq	-11,827,275	70,701,424
acidification potential: average European	kg SO2-Eq	-24,305	23,285
eutrophication potential: generic	kg PO4-Eq	-4,114	47,208
freshwater aquatic ecotoxicity: FAETP infinite	kg 1,4-DCB-Eq	-7,762,943	84,952
human toxicity: HTP infinite	kg 1,4-DCB-Eq	-80,956,929	-842,973
resources: depletion of abiotic resources	kg antimony-Eq	-763,892	-121,562

Table 6 Full set of WRATE results for the Modelling Approach Using the WRATE default Energy Mix

Impact Assessments	Unit	Gasification	Landfill
climate change: GWP 100a	kg CO2-Eq	-39,066,635	65,347,660
acidification potential: average European	kg SO2-Eq	-64,651	15,360
eutrophication potential: generic	kg PO4-Eq	-8,049	46,434
freshwater aquatic ecotoxicity: FAETP infinite	kg 1,4-DCB-Eq	-8,109,202	16,777
human toxicity: HTP infinite	kg 1,4-DCB-Eq	-83,099,124	-1,264,627
resources: depletion of abiotic resources	kg antimony-Eq	-979,017	-163,846

Table 7 WRATE Default Energy Mix for the UK in 2022

	Baseline Fuel Mix (%)	Generating Efficiencies (%)	Marginal Energy Mix (%)
Coal	5.1	33.92	11.39
Oil	0.49	26.49	0
Gas	2.31	41.19	0
Gas CCGT	33.96	46.84	88.61
Nuclear	17.86	35.71	0
Waste	0	19.38	0
Thermal other	0.56	22.64	0
Renewables thermal	7.69	27.47	0
Solar PV	0	15.52	0

	Baseline Fuel Mix (%)	Generating Efficiencies (%)	Marginal Energy Mix (%)
Wind	27.35	25	0
Tidal	1.61	82	0
Wave	0	82	0
Hydro	1.94	82	0
Geothermal	0	82	0
Renewable other	1.14	82	0

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Enhancing Society Together

Biossence Hooton Park

CHP Ready Assessment

16th May 2014

Revision: Final

biossence Hooton Park

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1.0 Introduction

Biossence Hooton Park Limited (BHL) is developing the Hooton Park Sustainable Energy Facility (HOPSEF) in Eastham, The Wirral. The project is intended to provide a highly efficient energy recovery solution utilising technology provided by Valmet for refuse derived fuel (RDF) that could not be re-used or recycled.

Site search criteria included acceptability (planning, environmental, local impact and transport), availability and deliverability, the latter of which requires a secure and long term off take for the energy generated by the plant. The site will be close to the major conurbations of Manchester and Liverpool essential for sourcing fuel. The most suitable solution to date has been the export of the energy as electricity to the local network.

The Environment Agency requires that all applications for Environmental Permits for new installations regulated under the Environmental Permitting (England and Wales) Regulations 2010 demonstrate the use of Best Available Techniques (BAT) for a number of criteria, including energy efficiency.

One of the principal ways in which energy efficiency can be improved is through the use of combined Heat and Power (CHP). The HOPSEF facility is classed as an Energy from waste facility with a throughput of more than three tonnes per hour of non hazardous waste and shall be subject to a CHP assessment.

The guidance document CHP Ready Guidance for Combustion and Energy from Waste power plants requires that three BAT tests should be applied to the new installation.

First BAT Test:
The Environment Agency considers that BAT for energy efficiency for new combustion power plant or Energy from Waste (EfW) plant is the use of CHP in circumstances where there are technically and economically viable opportunities for the supply of heat from the outset.

Second BAT Test:
In cases where there are no immediate opportunities for the supply of heat from the outset, the Environment Agency considers that BAT is to build the plant to be CHPReady (CHP-R) to a degree which is dictated by the likely future opportunities which are technically viable and which may, in time, also become economically viable. The term ‘CHP-R’ in this context represents a plant which is initially configured to generate electrical power only but which is designed to be ready, with minimum modification, to supply heat in the future. The term 'minimum modification' represents an ability to supply heat in the future without significant modification of the original plant / equipment1. Given the uncertainty of future heat loads, the initial electrical efficiency of a CHP-R plant (before any opportunities for the supply of heat are realised) should be no less than that of the equivalent non-CHP-R plant.

Third BAT Test:
Once an Environmental Permit has been issued for a new CHP-R plant, the applicant / operator should carry out periodic reviews of opportunities for the supply of heat to realise CHP. Such opportunities may be created both by new heat loads being built in the vicinity of the plant, and / or

be due to changes in policy and financial incentives which improve the economic viability of a heat distribution network for the plant being CHP.

Valmet's precedent plant in Lahti, Finland has already demonstrated the potential of the proposed plant to offer a CHP scheme and BHL is keen to explore the environmental benefits and the high fuel efficiency which CHP provides through the reduction in carbon dioxide emissions.

BHL will assess the viability of CHP opportunities within the vicinity of the proposed location for the plant by examining the location, the economic feasibility and the analysis of local heat opportunities.

The largest, most economic opportunities are usually to be found in the industrial sectors where there are often large requirements for process heat, however there are a growing number of opportunities in commerce (e.g. hotels, leisure centres) and public services (e.g. hospitals, universities). Additional opportunities may arise where heat can be used in absorption chilling to deliver cooling in industry, commerce and the public sector.

Technical considerations, such as the distance of the potential heat customer from the development and the type of heat load that the proposed site can feasibly produce, will dictate the extent of "local" and the assessment of whether such local opportunities have been properly taken into account will be based on the evidence presented in the feasibility sections of this paper. In evaluating this opportunity however, it should be recognised that in some cases CHP will not always be an economic option.

2.0 Site location and the viability of the site for CHP

The site selection process involved identifying sites suitable for a waste processing facility which achieved the best balance between:

- Acceptability – planning, environmental, local impact and transport;
- Availability;
- Deliverability; and
- Proximity to fuel source
- Proximity to gas, water and electrical transmission infrastructure.

CHP was not a key factor in the original site assessment for the previously consented facility but the suitability of sites for CHP schemes has subsequently become a key criterion when assessing site suitability and this is now considered as part of this application.

The site address is:-

Land at Hooton Park
Off North Road
Ellesmere Port
Cheshire
CH65 1AJ

The site itself Figure 1 is situated east of Eastham, within the southern boundary of the Metropolitan Borough of Wirral. The site is currently a mix of open grassland and groups of trees. A strip of woodland separated the north eastern boundary of the site from the Manchester Ship Canal and the Mersey Estuary beyond. The site is allocated for Class B2 (General Industrial) land use and is surrounded by predominantly industrial complexes which proliferate the banks of the Mersey Estuary. In terms of transport links the site is a 40 minute drive from John Lennon Airport. Eastham Rake train station is 2.7km to the west. The site is well served by road with junction 6 of the M53, approximately 1km to the south west, providing a quick route to the new designated site entrance on North Road.

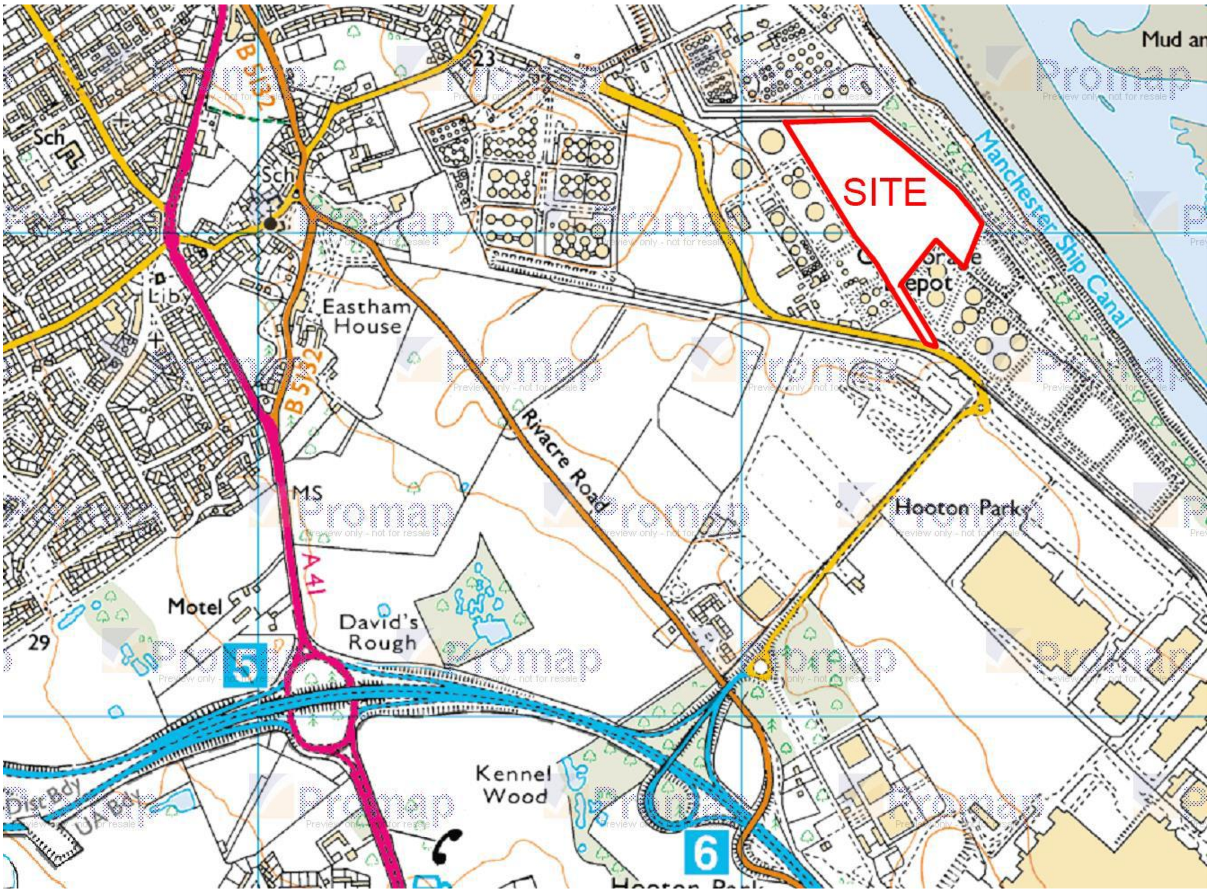


Figure 1 Site Location Plan

3.0 Exploration of the local heat opportunities

DECC UK CHP Development Map

BHL have consulted DECC's UK CHP Development Map[1] figure 2. The results indicate that there are nine large industrial loads within ten kilometres of the site which is depicted as a red star. A full breakdown of all the heat loads in the area are provided within table 1 and details of the large industrial loads are contained within table 2.

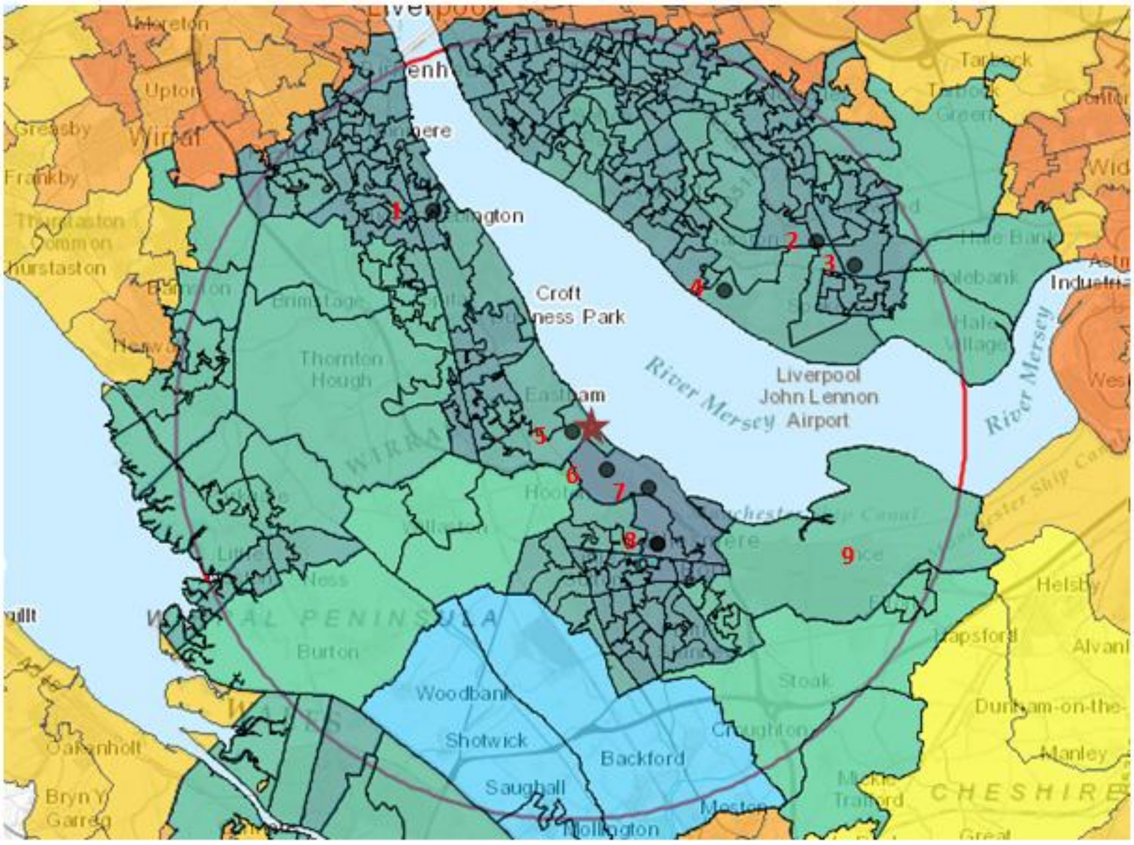


Figure 2 – DECC UK CHP Development Map for the area surrounding the BHL project

[1] DECC UK CHP Development Map (2012) http://chp.decc.gov.uk/developmentmap/#

Sector Name	Share	Total KW
Communications and Transport	0.14%	3,114 KW
Commerical Offices	1.32%	29,246 KW
Domestic	57.39%	1,268,618 KW
Education	2.35%	52,047 KW
Government Buildings	1.57%	34,691 KW
Hotels	1.86%	41,072 KW
Large Industrial	23.87%	527,703 KW
Health	0.36%	7,870 KW
Other	0.87%	19,196 KW
Small Industrial	6.48%	143,214 KW
Prisons	0.03%	614 KW
Retail	1.71%	37,872 KW
Sport and Leisure	0.68%	14,988 KW
Warehouses	1.37%	30,184 KW
Total heat load in Area		**2,210,429 KW**

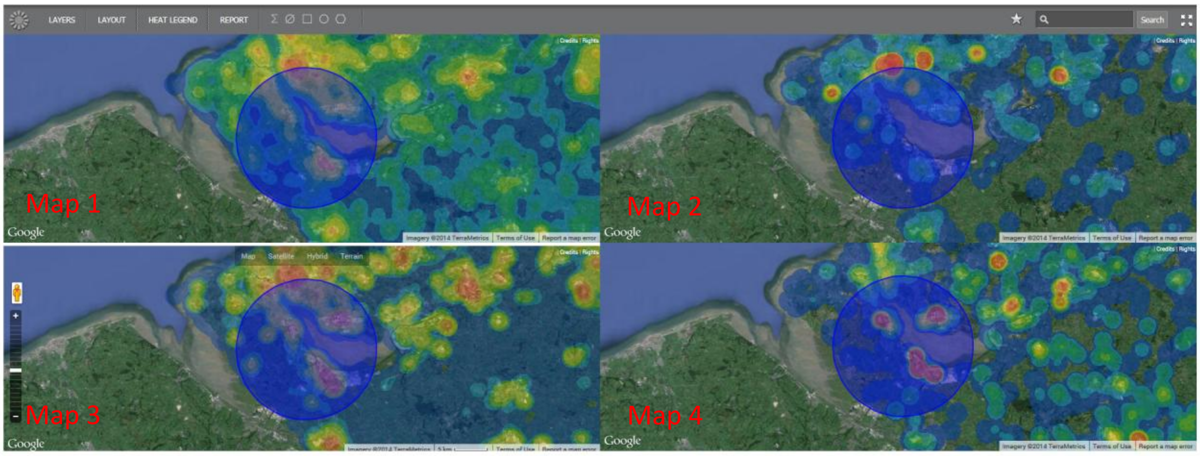
Table 1 – Heat loads within the vicinity of the BHL project

Facility	**Activity**	**Heat Load , kW peak**	**Distance from Site, km**	**Map Identifier**
Lever Faberge	Process chemicals	8,993	5.0	1
Eli Lilly and Company Limited	Pharmaceutical Manufacturer	14,262	9.0	2
Ford Motor Company Ltd and Jaguar Cars Ltd	Car manufacture	11,016	9.0	3
Prinovis Liverpool Ltd	Printing	10,800	6.5	4
Eastham Refinery Ltd	Oil refining	13,151	0.5	5
Vauxhall Motors Ltd	Car manufacture	13,709	2.0	6

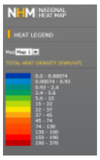
Npower Cogen Ltd	CHP generation	52,050 (heat shipper)	3.5	7
Innospec Ltd	Process chemicals	6,995	8.0	8
Essar Refinery (ex Shell UK Oil Products Limited)	Oil refining and chemicals	359,578 (likely heat shipper)	10.0	9
Total heat load for all large heat load sites		490,553kW		

Table 2 – Large Industrial Heat loads within the vicinity of the BHL project

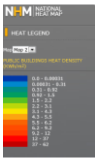
BHL have also consulted DECC's national heat Map[2] figure 3. The results indicate that there are five clusters of large industrial heat loads within ten kilometres of the site. A full breakdown of all the heat loads classifications in the area are provided within table 3.



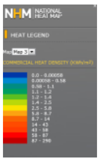
Heat Legends for the local area from the National heat map



Map 1 Total heat density

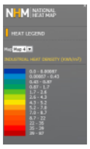


Map 2 Public buildings heat density



Map 3

Commercial heat density



Map 4

Industrial heat density

Figure 3 National Heat Map - 4 Scenarios

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[2] DECC NHM National Heat Map http://tools.decc.gov.uk/nationalheatmap/

Sector	Heat Demand (kWh)	Number of Addresses	Heat Density (kWh/m2)
Commercial Offices	59,200,000	1,889	0.189
Education	76,100,000	265	0.242
Government Buildings	75,600,000	103	0.241
Health	53,700,000	464	0.171
Hotels	118,000,000	753	0.377
Industrial	459,000,000	284	1.46
Other	10,500,000	210	0.0335
Postal	1,390,000	110	0.00444
Recreational	87,300,000	631	0.278
Residential	2,240,000,000	188,668	7.12
Retail	218,000,000	4,785	0.695
Science	849,000	10	0.00270
Transport	168,000,000	1,021	0.536
Total	**3,570,000,000**	**199,193**	**11.3**

Table 3 – Heat loads within the vicinity of the BHL project

<u>Other local potential medium sized heat users</u>

- Nustar tank farm an oil products storage facility at a distance from site of 500m
- Aeternum Oil and Fuel a biofuel refiner at a distance from site of 3.0km

<u>Local New development Opportunities</u>

Cheshire east and Chester council aim to undertake in Q 2/3 2014 a detailed local heat load study which will build upon the Low carbon and renewable energy Verco study undertaken in May 2012. They have coarsely identified through a heat mapping process that the two largest accumulations of heat loads are Chester and Ellesmere Port. Chester has a significant area of high heat density in the city centre. Ellesmere Port has an area of high heat load adjacent to the railway station with only a small number of large commercial loads but there are a number of significant sites and potential heat sources in the locality. Biossence Hooton will provide information to support the study and would connect to the heat network if commercially acceptable. It is anticipated that many of the new proposed developments listed below would connect to the heat network with potentially the Peel developments becoming the anchor projects.

- The University of Chester Expansion of industrial innovative ventures (ex Shell Thornton research centre) at a distance from site of 12km which was historically provided heat by the Shell Stanlow Refinery now Essar.

- Ellesmere Port Waterfront / Ellesmere Quays Peel and National Waterways Museum (Expansion of existing infrastructure) at a distance from site of 5km a development comprising new homes and retail
- Port Bridgewater Peel (Port facility ex paper mill site) at a distance from site of 3.5km a large warehousing development with river frontage facilitating a freight distribution network.
- Pioneer Business Park (Development adjacent to Regatta and Interserve distribution) at a distance from site of 3.5km comprising industrial units, retail and new homes
- Port Wirral Peel at a distance from site of 3.0 km rejuvenation of existing wharf facilities facilitating a freight distribution network.
- Port Ince Peel at a distance from site of 11.0km rejuvenation of existing wharf facilities facilitating a freight distribution network.
- Ince Resource Recovery Park Waste to energy and Biomass plant Peel / Covanta at a distance from site of 11.0km comprising a waste recycling facility, waste to energy facility and a biomass boiler
- Jaguar Motors Parts distribution centre adjacent to Vauxhall Motors at a distance from site of 2.0km takeover of an existing empty 400,000 sq ft warehouse that was previously used by Syncreon Logistics to supply the Vauxhall site.

Wirral county council have prioritised energy efficiency in dwellings, solar and biomass boilers.

4.0 Contacted Local Organisations

BHL have engaged with local large heat users namely Nustar, Eastham Refinery and Vauxhall motors. Local heat users were selected as the necessary heat transport infrastructure is more likely to be commercially viable. A renewable heat value benefit analysis was presented in face to face meetings to each of the potential users and a questionnaire designed to determine their exact heat requirements was provided.

BHL will continue to engage with Cheshire east and Chester council and participate within any heat network opportunities which will likely be centred on the Ellesmere Port area.

Heat loads to the north of the River Mersey have been discounted as they are not considered feasible at this time, as this would require the installation of supply and return pipes beneath the River Mersey which would carry both additional technical and environmental constraints.

Appendix A summarises the responses received and current status of progress from each of the organisations contacted.

5.0 Technical feasibility

BHL describes in this section how the plant will be designed with the capability to extract heat from the steam cycle. Whilst the export of heat from the plant is technically feasible, this heat would in fact not be 'waste' heat but heat that currently contributes to the high process efficiency of the proposed plant. Removing this heat will reduce the electrical output of the plant and the economic impact of this reduction is examined in the economic feasibility section below.

Technical feasibility assessment

BHL has selected a world leading gasification technology from Finnish company, Valmet Power. Valmet Power has recently delivered an equivalent but larger facility in the City of Lahti in Finland, a reference plant that supplies 90MWth to the local district heating network in addition to the 50MWe that is exported to the local grid infrastructure. The overall plant efficient of this project is 80 per cent and clearly demonstrates both the benefits of the CHP and the capabilities of the technical solution BHL is proposing for Hooton Park project.

BHL Heat Supply Options

Heat can be supplied from the process in the form of steam and/or hot water.

<u>Steam</u>

The supply of steam is limited by distance. Piping steam over a long distance is usually expensive and inefficient as the mains have to be oversized and heavily insulated to avoid loss of pressure or temperature. Process steam users require steam at particular temperatures and pressures, and loss of these specific conditions can result in the process working ineffectively or not at all. It is likely that only local to site operations would be able to take steam.

Steam can be extracted from the steam turbine and it is typically used in processes where a high grade (temperature) of heat is required. Steam would be extracted via a bleed on the turbine and piped to the steam user. Where steam is captured from the process and condensed, the condensate can be returned to the boiler feedwater of the plant. Care has to be exercised to avoid any contamination being carried in the return condensate to the boiler.

<u>Hot Water</u>

For the proposed layout, heat can be recovered from four locations to generate hot water.

1. Steam turbine.

   Steam extracted from the steam turbine can be used to generate hot water for district heating schemes. District heating schemes typically operate with a flow temperature of 90^{o}C to 120^{o}C and return water temperatures of 50^{o}C to 80^{o}C. Steam is extracted from the turbine at low pressure to maximise the power generated from the steam. The steam is passed through a condensing heat exchanger, with condensate recovered back into the feedwater system. Typically steam turbines of this size typically have three extractions. A 'base load' of heat can be supplied from the first extraction on the turbine, with peak heat loads met from the steam inlet. This source of heat offers the most flexible design for the facility. The steam bleeds can be sized to provide additional steam above the plant's parasitic steam loads. However the size of the heat load will need to be clearly defined to allow the steam bleeds and associated pipework to be adequately sized. Increasing the capacity of the bleeds once the turbine is installed is difficult. The use of steam also allows the supply of low pressure steam as an alternative to hot water.

2. Flue gas.

The flue gas from the flue gas treatment plant contains water in vapour form. The flue gas from the flue gas treatment plant is typically around 140°C. This can be cooled further using a flue gas condenser to recover the latent heat from the moisture. This heat can be used to produce hot water for district heating (90°C to 120°C). The additional cooling of the flue gas results in the production of a visible plume from the chimney. Although this is only water vapour it can be misinterpreted as pollution. The water condensed from the flue gas needs to be treated and then discharged. The discharges are achieved through a controlled consent. While the flow of this flue gas is substantial and it is technically possible to do this, the temperature difference where heat can be recovered is about 15°C. There is also a trade off, since this heat also already serves an important purpose, that of providing buoyancy to the air emissions plume, necessary for optimum dispersal. Calculations estimate that only 670kWth could be recovered by the flue gas heat recovery method.

Given the existing important use of the flue gas heat for maintaining adequate plume dispersal minimising environmental impact wherever possible, BHL has decided that the flue gas heat is not a useful line of enquiry.

3. Condenser.

Wet steam emerges from the steam turbine typically at around 40°C. The steam holds approximately two thirds of the energy from the steam. This energy can be recovered in the form of low grade hot water from the condenser depending on the type of cooling implemented. In the event that a mechanical draught or hybrid cooling tower is installed, the cooling water is warmed as the steam is condensed in a water cooled heat exchanger. The heat recovered by the cooling water can be used for heating instead of being rejected in the cooling tower. This does not reduce the power output from the plant. However the heat is very low grade and there are few viable uses for the heat. Typically under-floor heating uses hot water of 40°C; however under floor heating is likely only to be economically viable in new build developments where conventional wet type radiator systems are more common in the UK. An air-cooled condenser will be installed at this facility. Steam is condensed in a large air cooled system which rejects the heat in the steam into the air flow. An air cooled condenser does generate a similar temperature condensate, but cooling this condensate further by using it for space heating requires more steam to be extracted from the turbine to heat the feedwater prior to being pumped into the boiler. The additional steam extraction reduces the power generation from the plant.

4. Bottom Ash extraction

Recovery of heat from the cooling water within the bottom ash extraction system presents a final opportunity to recover a further 233 kWth of heat energy.

The heat from the bottom ash extraction system although small could contribute to a the plant's output if a larger scale CHP was subsequently developed, but it does not represent a sufficient source of heat to establish a CHP scheme in its own right.

Analysis of the Steam Turbine Steam Abstraction Capacity

The Valmet Power gasification technology uses the sensible and chemical heat energy from the syngas by combusting the latter in a gas boiler. Since the gas has been filtered to remove components on which corrosive compounds could occur, it is possible to combust the gas at significantly higher temperatures than conventional Energy from Waste technologies. Before filtering the gas is produced at 850°C in the gasifier before being cooled to 400°C by a high pressure Heat Recovery Unit (HRU). This heat energy is not lost to atmosphere but recovered and used to raise the boiler feed water temperature to 180°C (instead of 135°C which is conventional). These two factors enable the gasification technology to raise steam to 540°C instead of circa 380°C, which is typical of conventional systems, with the higher steam temperature enabling the plant to achieve a higher level of operational efficiency.

BHL has commissioned a model to determine how much energy can be extracted from the turbine before damaging exhaust steam flow conditions are experienced. The exhaust steam flow is 78% of the inlet flow. The exhaust steam flow can be reduced by up to a half by extracting steam for heat before damage will occur. Therefore it is possible to extract 51.15 tph of steam from the steam turbine. The steam cycle for the facility is depicted in Figure 4 which shows the facility heat process flows and the maximum power generation.

Extraction of steam prior to the admission to the steam turbine will be possible with minor pipework alterations. The only other possible steam extraction ports are the bleed ports on the steam turbine itself. Extraction from the standard bleed steam ports on the turbine will require design modifications to be undertaken by the steam turbine manufacturer to increase the capacity this will include confirmation that sufficient space is available within the blade row to enable the larger extraction quantities. The steam turbine has three installed bleed steam ports which are used to provide process steam to optimise plant efficiency and performance.

The "z" factor is a measure that determines the effects of abstracting heat from the plants steam cycle on the plants electrical generation output, the lower the z factor number the greater its effect on electrical generation output.

Analysis of the steam turbine has identified that a maximum of 49.1MWth of heat is able to be extracted from the steam prior to admission to the steam turbine inlet. This high grade heat 117 barg 537°C, 3453 kJ/kg is reduced in pressure to 10 Barg with a useful heat content of 2717 kJ/kg producing a low "z" factor of circa 2.7.

An alternative is to draw heat from the 1st steam extraction port from the steam turbine. The steam conditions at the first extraction port are 3.1 bara, 135.1°C, with a useful heat of 2300kJ/kg with an energy content of 38.7MWth. To preserve the bleed steam pressure at the extraction point high pressure inlet steam will be required to augment the bleed steam. It is envisaged that the “z” factor at this location will be circa 7.

The two scenarios are graphically represented in Figure 5 which depicts the ratio of the loss of electricity generation against heat generation. The graph depicts heat extraction at 10 Bar and 3.1Bar with the assumption that condensate is returned to the facility at 30°C. The heat extraction quantities depicted are reflective of the potential local demand. The gradient of the slopes are the respective ‘z’ factors. Further steam cycle models that reflect the heat extraction modelling scenarios are contained within Appendix C

The bleed steam extraction ports 2 and 3 have process conditions that optimise the operational process but are below the steam conditions necessary for adoption in high temperature hot water CHP distribution schemes.

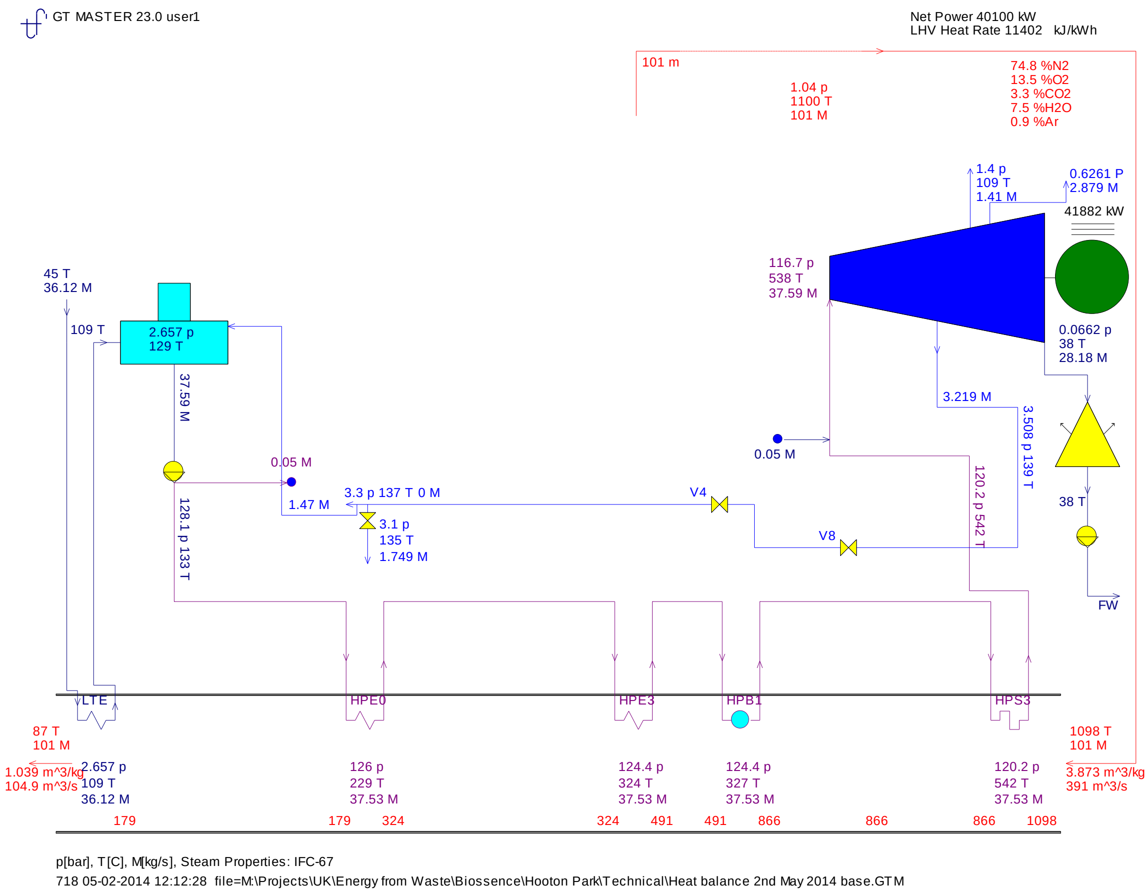


Figure 4 – The Steam Cycle for the BHL project

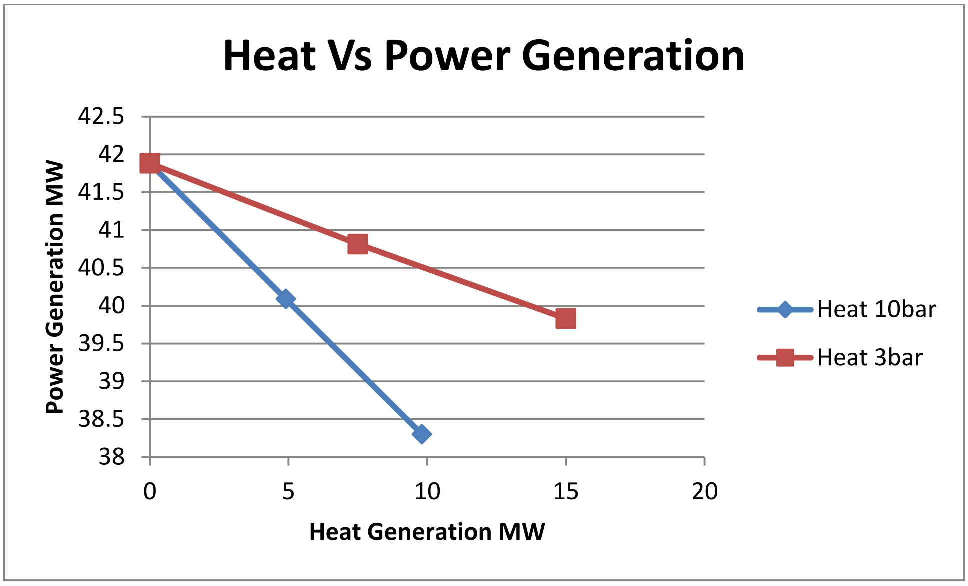


Figure 5 – Electricity Generation Vs Heat Generation Modes- Gradient of line is the 'z' factor

In order to accommodate the additional equipment associated with heat export and to make the plant "CHP ready", BHL has allocated space within the turbine hall for the additional equipment.

It should be noted that space within this building has not been allocated for back-up boilers or water pressurisation and dosing equipment associated with a complete energy centre. The turbine hall and civil engineering foundation and building designs will be made ensuring adequate loading and space have been accounted for, to house components associated with a district heating off take from the outset. Electricity required for powering the district heating components can be sourced as part of the parasitic load for the overall plant from the grid.

Conclusions

The optimum solution is to generate heat by extracting steam from the steam turbine. The heat can be supplied as steam or hot water. This method for the supply of heat is considered to be favourable for the following reasons:

1. There are no obvious users within the immediate vicinity of the plant for 30^{o}C to 40^{o}C hot water.
2. The use of a flue gas condenser will generate a visible plume which will be present for significant periods of the year. This is not desirable as it will significantly add to the visual impact of the plant and as such has not been included.
3. There is insufficient heat available for export associated with the bottom ash coolers
4. Sufficient heat is available from the steam turbine. The use of steam from the turbine offers the most flexibility to allow for heat to be supplied to future developments.

Contracting and counterparty risk

An equally important but less tractable consideration in purely economic terms is the incremental risk that the off-take of heat can introduce. Whereas electricity is a commodity that can be exported relatively easily and for which there already exists an established and well understood market, the export of heat is only possible over limited distances and is far more contingent on the scale of demand, heat density and presence of local infrastructure.

For the BHL project to be indifferent between the export of electricity or heat, the contract between a 3rd party consumer or heat network and BHL would need to offer a guaranteed route to market in the same way that a grid connection and power purchase agreements (PPAs) provide such security for electricity export. This is typically prohibitive when contracting with a single customer unless they are of significant financial standing to offer the generator a long term guarantee but is more straightforward with a network where the credit risk can be spread over a greater number of consumers. The converse situation exists for the consumers who require guarantees around supply in the event a generator is shut down for maintenance.

6.0 Value of Heat: Worked Example

Economic feasibility assessment

The assessment of the economic feasibility of a CHP scheme for the BHL project can be determined by consideration of the following three subjects:

i. Price of heat required
ii. Contracting and counterparty risk
iii. Local infrastructure availability and costs

This paper sets out an analysis of both the price currently paid by consumers and the price required by generators to understand whether a mutually acceptable heat tariff is achievable. The analysis also includes the cost impact of any additional capital expenditure required to implement a CHP scheme as well as additional benefits that may accrue through the award of Enhanced Capital Allowances.

For the export of heat to be preferred to the export of electricity, the price at which heat is to be sold must be acceptable to both parties. The vast majority of the UK's current requirement for heat is met through the combustion of either natural gas or oil in boilers. For consumers to be interested in purchasing heat either directly from the BHL project, the price must at least be equivalent to the cost to the consumer of generating heat from these sources. This cost predominantly consists of the input fuel costs of the fossil fuel but for larger industrial clients, will also include a Climate Change Levy (CCL) and the potential to surrender European Emissions Trading Scheme (EUETS) certificates.

For generators to commercially export heat, the revenues received from the sale of heat must at least compensate the project for the loss in revenues from any reduction in electrical output. Electricity based revenues consist of wholesale power revenues together with associated benefits and, in the case where the generating station qualifies as a renewable power generator, additional revenues received from the sale of renewable obligation certificates (ROCs) and levy exemption certificates (LECs). The incremental revenues associated include the revenue from the sale of heat and, if a renewable generator, revenues received through the renewable heat incentive (RHI).

Current consumer costs

A sensible starting point when evaluating whether there might be a mutually acceptable price to both consumers and generators of renewable heat is the current cost of heat. For the purpose of the analysis set out here, it has been assumed that the majority of consumers rely on natural gas to generate heat. Where this is not the case and consumers rely on oil fired heating systems, a higher price for heat may be sustainable.

The price of natural gas fired heating systems depends on a series of factors namely the cost of the input gas, the efficiency of the boiler and whether or not the climate charge levy (CCL) applies to the end customer. The table below summarises the total costs of generating heat from natural gas under three different price scenarios:

	Low	*Central*	*High*
Input fuel costs:			
- Natural gas price (p/therm)		60.0	
- Natural gas price (p/kWh)		2.05	
CCL charge (p/kWh) (if applicable)		0.18	
Total fuel cost		2.23	
Boiler efficiency	90%	85%	80%
Cost to consumer of 1kWh of heat(p)	2.48	2.63	2.79

This analysis suggests that provided a price of between 2.48 and 2.79 p/kWh is acceptable to generators, then the export of heat would be attractive to consumers.

Heat price required by generators

The heat price required by generators will be a function of the change in mix of project revenues, together with any additional costs or benefits related to the establishment of a CHP scheme.

The analysis below includes a number of assumptions about contract for differences on power output, the renewable heat incentive, market based pricing capital cost estimates (CHP equipment) and the value of equipment that would qualify for Enhanced Capital Allowances. In all cases, BHL has included a range of estimates that will lead to either a low, central or high price for heat.

- *Impact on project revenues*
  Extracting heat from the steam cycle for the purposes of exporting reduces the electrical output of the plant. A reduction in the electrical power exported reduces the project revenues and creates a shortfall in income in the base case financial model. For there to

be no impact on the financial model, the incremental revenues and other value derived from the sale of heat should at least equate to this revenue loss.

The following table depicts the effects of lost electrical generation for both the 10 Bar process steam and 3Bar extraction for high temperature hot water cases at an assumed plant availability of 7,800 hours per annum.

parameter	10 bar **process** steam	3 Bar for High temperature **hot water**
Heat extracted	9.8MW	15.0 MW
Lost electrical generation	3.6 MW	2.1 MW
Loss electrical generation per annum MWh	28,080	16,380
Loss electrical generation per annum kWh	28,080,000	16,380,000

The total revenue lost is this total generation multiplied by the contract for differences bundled price for power, low, central and high values for which are presented in the table below:

(p/kWh)	*Low*	*Central*	*High*
Wholesale power price[3]	2.50	3.00	3.50
Contract for Difference[4]	6.75	6.75	6.75
Other benefits[5]	0.20	0.50	0.50
Bundled price / kWh	**9.45**	**10.25**	**10.75**

The annual loss in project revenues resulting from the reduced electrical output for the process steam would therefore be between £2.65m and £3.02m with a central estimate of £2.88m.

The annual loss in project revenues resulting from the reduced electrical output for the high temperature hot water would therefore be between £1.55m and £1.76m with a central estimate of £1.68m

This shortfall in project revenue will need to be met by the new revenues associated with the sale of heat. Part of this shortfall is made up from revenues received from the Renewable Heat Incentive (RHI) for large biomass boilers. Under the proposed legislation, the project would qualify for a payment of 2.0 p/kWh generated from the

[3] Biossence's current estimate of UK power prices for 50% of the electrical generation (non renewable) .

[4] Contract for Difference expected to realise £135/ MW for 50% of the electrical generation (renewable)
[5] Includes TRIAD payments and other revenue benefits related to the connection of the plant to the distribution network.

biomass fraction of the input RDF material for seven years (as per the support mechanism for the generation of electricity. Assuming that the full 9.8 and 15MWth is exported continuously for the 7,800 hours of forecast plant operation, this equates to additional annual revenues of approximately £0.77m and £1.17m.

The balance of the shortfall in project revenues needs to be funded through the value of heat itself and the table below summarises what this value needs to be in the each of the low, central and high price scenarios described above. It is clear that the heat price required for process steam is not attractive due to the low ‘z’ factor and proportionally very high reduction in electrical generation output.

The worked example will continue with the high temperature hot water case which is commercially attractive.

(p/kWh)	*Low*	*Central*	*High*
Heat price required process steam	**2.47**	**2.77**	**2.95**
Heat price required high temperature hot water	**0.32**	**0.44**	**0.51**

- *Price required to cover additional Capital Expenditure*

In order to enable heat to be exported from the BHL plant, a number of additional items of equipment will need to be acquired. The table summarises the main items and provides a provisional cost estimate together with low and high estimates 25% below and above this figure respectively.

£	*Low*	*Central*	*High*
CHP equipment			
- Heat exchanger(s)		£300,000	
- Ancillary plant		£800,000	
- Hot water pipework		£2,000,000	
Instrumentation, installation, overhead & contingency		£800,000	
Total cost	**2,925,000**	**3,900,000**	**4,875,000**

For a generator to be indifferent between the export of electricity and heat, this additional cost needs to be recovered through the heat sales tariff. BHL has evaluated the incremental price required to do this using a discounted cash flow analysis over 7 years at a real discount rate of 12% to reflect the duration of the renewable heat incentive and a maintenance annual charge of 5% of capex.

	Low	*Central*	*High*

Annual Fee £	146,000	195,000	243,750
Resultant p/kWh	**0.67**	**0.90**	**1.12**

- *Benefits accruing from the award of ECAs*

  Enhanced Capital Allowances (ECAs) were introduced in 2001 as part of the UK Government's commitment under the Kyoto Agreement to reduce UK carbon dioxide emissions. Every year DECC and DEFRA undertake a review of water and energy saving technologies and produce a list of equipment that qualifies for tax relief or credits.

  Provided BHL project can meet the plant performance requirements of the CHP QA scheme, qualifying equipment purchased for the project would qualify for 80% tax relief in the first year of operation which has a value to either the project itself or to other group companies where the relief can reduce taxable income. For the purpose of this analysis, it has been assumed that 90% of the value of the ECAs would accrue to the project company.

  Establishing a list of qualifying equipment is an involved process that requires a detailed list of plant components. Whilst this is not possible at this early stage of project development, BHL has assumed that between 40-60% of the total project CAPEX may qualify and derived an equivalent but beneficial price impact to that used above using discounted cash flow analysis over an equivalent timeframe and at the same discount rate. The decrease in price afforded to the project through the receipt of ECAs would be as follows:

(p/kWh)	*Low*	*Central*	*High*
- 7 yrs	(0.06)	(0.05)	(0.04)

7.0 Value of Heat Conclusion

The outcome of the value of heat analysis drawing steam from the bleed port "z" factor 7.16 is as follows:

(p/kWh)	*Low*	*Central*	*High*
Current cost of heat to consumer	**2.48**	**2.63**	**2.79**

Value required be generator			
- Revenue substitution	0.32	0.44	0.51
- CAPEX for new CHP equipment	0.67	0.90	1.12
- ECA credit	(0.06)	(0.05)	(0.04)
Total heat value required	**0.93**	**1.29**	**1.59**

Based on the information presented in the table above, the off-take of heat could be economically attractive. The offtake of 10 Bar process steam was discounted earlier in the analysis. The current cost of generating heat by the consumer is higher than would be required by the BHL project and provided the cost of establishing a connection to these sources of heat is not substantial, there would appear to be a good opportunity to establishing a CHP scheme. This is predominantly the result of the trade-off between power and CFD income on 2.052MW of electrical export against the RHI and wholesale revenues on the sale of 15MW of heat.

However, there are a number of caveats to this analysis which are summarised in order of importance below:

- High temperature hot water heat demand has been assumed to be continuous. Should heat demand fluctuate between seasons and there are periods of reduced demand the fixed capital cost recovery will lead to a variable charge per kw of heat being applied see Appendix B
- The heat supply is not firm no provision has been made in the model for standby boilers.
- The heat supplied is not for process use requiring hot standby boilers
- The return of hot condensate to the plant will not be contaminated by the heat user. No provision has been made within the model for make-up boiler feed water and condensate return clean up
- It has been assumed that the full output of the BHL project derived from the biomass fraction 50% of the input RDF fuel will qualify for the RHI.
- The turbine is capable of extracting the 15MW thermal at the bleed steam port 3 BarA however taking process heat from the inlet to the steam turbine 117 BarA is a less efficient conversion
- It is not yet clear whether a CHP scheme would meet the requirements of the CHP QA programme and qualify for Enhanced Capital Allowances. Independently, the total value of qualifying equipment may be lower than anticipated in this document. Both outcomes could lead to a reduced beneficial impact from ECAs.

8.0 CHP Assessment

BHL has given full consideration to the opportunities to develop Combined Heat and Power (CHP) as part of the development of the proposed facility. The key conclusions from this assessment are as follows:

- *Limited Immediate opportunities to export heat*

- *BHL plant is technically capable of exporting heat*

  The BHL plant will have the technical capability to export heat through the extraction of steam at various points in the steam cycle. Biossence has increased the building envelope for the plant to create space to house some of this equipment on site. Furthermore, while BHL do not consider the export of waste heat from the flue gas and bottom ash extraction cooling system as sufficient to justify a CHP scheme in their own right, these sources of 'waste' heat could contribute to a wider CHP scheme if one is developed.

- *Economically attractive*

  The economic analysis presented in this paper suggests that the export of heat would be economically attractive to BHL. A number of the assumptions made in this paper would need to be verified to confirm this, but the cost of generating heat from fossil fuels is sufficiently high to make the purchase of heat from the plant attractive to both generator and consumers.

  The capital cost of the CHP equipment may increase the price of heat required by the generator but analysis presented here suggests that value derived from Enhanced Capital Allowances may more than compensate the project for this increase in cost provided the scheme qualifies under the Renewable Heat Incentive scheme.

- *Limiting factors - contracting issues and infrastructure costs*

  Possibly the greatest challenge to establishing a scheme will be the lengths of any contracts that can be secured that can underwrite the additional infrastructure investment costs and the strength of the counterparty offering the agreement.

BHL recognises the benefits of combined heat and power schemes both in terms of the efficiency gains and related environmental benefits such a scheme could offer and the economic value to contracting for heat as demonstrated in the this paper. BHL will continue to engage with both Vauxhall motors and the West Cheshire and Chester council regarding future opportunities for the facility to supply heat. Contracting and infrastructure issues aside, this paper has demonstrated that the off-take of heat in place of electricity could in fact improve the overall plant economics for the BHL project.

The BHL plant will be CHP ready and will be able to deliver renewable heat should credit worthy industrial consumers be secured.

A council lead local heat distribution network offering guarantees over the supply and demand of heat could go a long way to mitigate this, although the incremental cost implications of operating and maintaining such a network would need to be factored into the value analysis presented here to confirm that an economic case can still be made for the BHL project to supply heat at the expense of electricity.

Biossence Hooton believes such a case can be made and although the BHL project is unable to make the firm commitment to establish a heat off take facility from the site in the current absence of viable customers, the BHL project remain committed to continually assessing the opportunity to do so if this should change either prior to financial close or once the plant is operational.

Appendix A Core Local Opportunities

Contacted party	Heat load (MWth)	CHP status
Vauxhall Motor Company	HTHW	BHL has invited expressions of interests from Vauxhall. The analysis of the heat needs is ongoing. A confidentiality agreement is in place to enable the sharing of information. BHL and Vauxhall are actively continuing to explore this opportunity.
Eastham Oil Refinery	10 Bar 13tph	BHL has invited expressions of interests from Eastham Oil Refinery. BHL is continuing to explore this opportunity.
Nustar	10Bar 10tph	BHL has invited expressions of interests from Nustar. BHL is continuing to explore this opportunity.
Cheshire west and Chester Council Heat Network	Heat Network	BHL will provide support to the study.

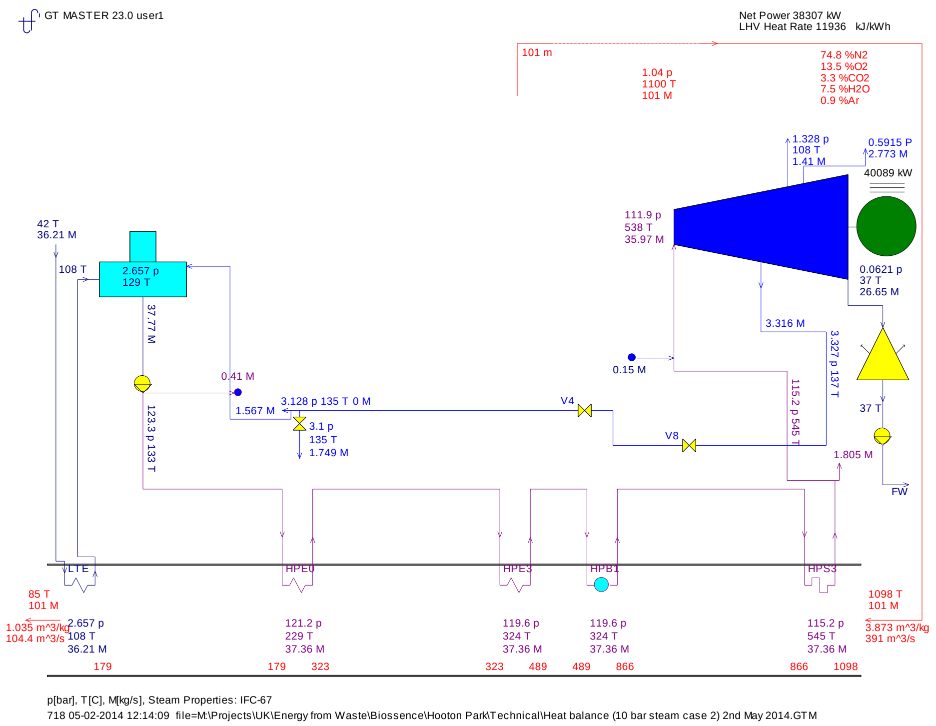
Appendix B Reduced Heat Utilisation Consequence

The heat price required significantly rises with a reduction to only a 30% utilisation of the heat available. The fixed capital cost recovery tariff is now applied on a significantly reduced energy volume.

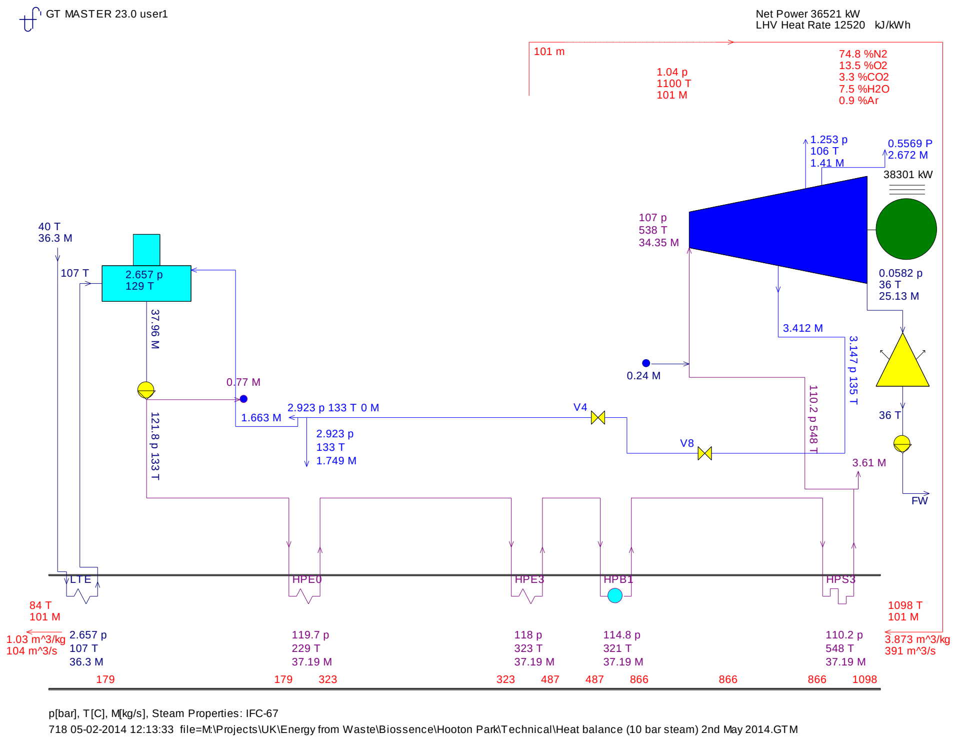
(p/kWh)	*Range*
Current cost of heat to consumer	**2.48 to 2.79**
Price required be generator	
- Revenue substitution	0.32 to 0.51
- CAPEX for new CHP equipment	2.24 to 3.74
- ECA credit	(0.04) to (0.06)
Total heat price required	**2.52 to 4.19**

Appendix C Steam Cycle Modelling Scenarios

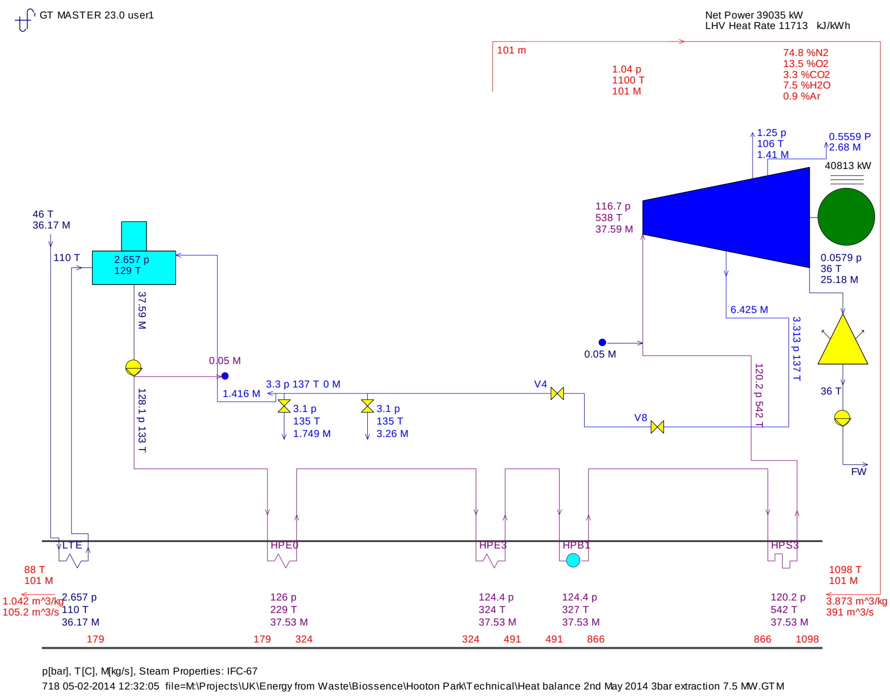
Steam Cycle Modelling for the Process steam case 4.9MW heat extraction



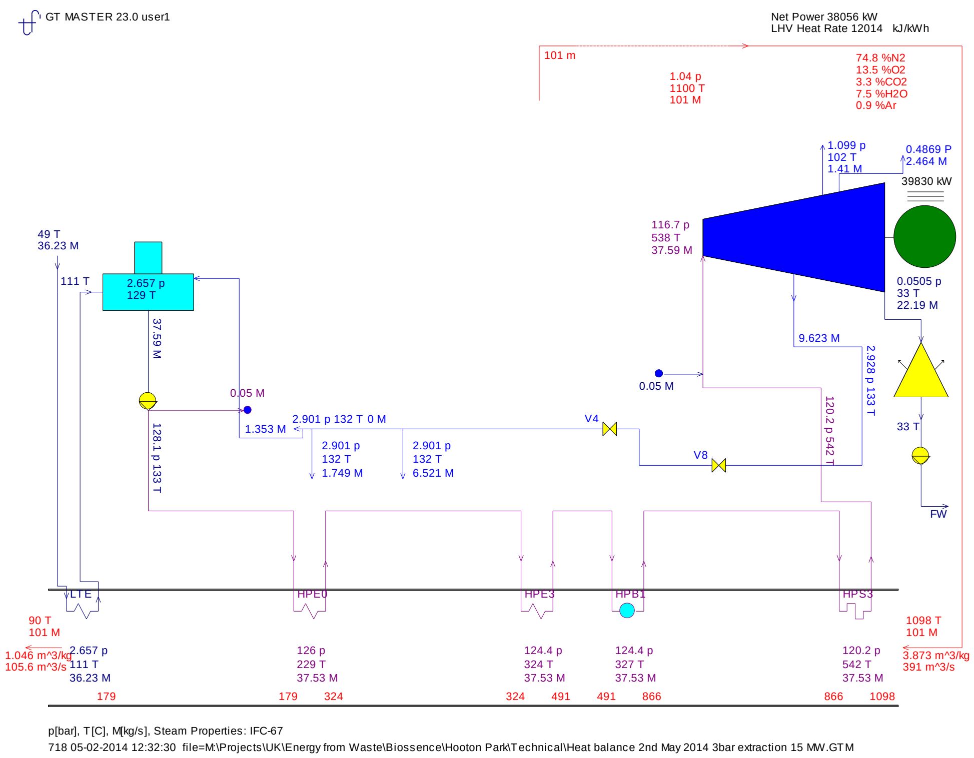
Steam Cycle Modelling for the Process steam case 9.9MW heat extraction



Steam Cycle Modelling for the 3Bar High temperature hot water case 7.5MW



Steam Cycle Modelling for the 3Bar High temperature hot water case 15MW



KOBELCO ECO-SOLUTIONS CO., LTD. BWSC

HOOTON BIO POWER LIMITED

Energy Efficiency Formula

4^{th} of June 2017

Rev. No.: 0

Project No. 3544

R1 Energy efficiency Formula

Ref.: http://www.ciwm.co.uk/ciwm/knowledge/the-r1-energy-efficiency-formula.aspx

The Revised Waste Framework Directive (WFD Directive 2008/98/EC) specifies that incineration facilities dedicated to the processing of municipal solid waste can be classified as R1 only where their energy efficiency is equal to or above 0.65 for installations permitted after 31st December 2008.

The formula used is:

$$\text{Energy Efficiency} = \frac{(E_p - (E_f + E_i))}{(0.97 * (E_w + E_i))}$$

In which:

E_p	The annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by 2.6 and heat produced for commercial use multiplied by 1.1 (GJ/year)
E_f	The annual energy input to the system from fuel contributing to the production of steam (GJ/year)
E_i	The annual energy imported excluding ,E-w and E-f (GJ/year)
E_w	The annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/year)
0.97	The factor accounting for energy losses due to bottom ash and radiation

Assumptions

Plant operating hours:	7,500 h/y
Average waste feedstock LCV:	10.5 MJ/kg (not used in calculation)
Expected auxiliary fuel input:	1% (assumption)
Auxiliary electric consumption:	15% of generator output (assumed)
Thermal input:	88.7 MW
Nominal generator output:	28 MW

$E_w = 88.7 \cdot 7{,}500 \cdot 3.6 = 2{,}394{,}900$ GJ
$E_f = 0.01 \cdot E_w = 23{,}949$ GJ
$E_p = 28 \cdot 7{,}500 \cdot 3.6 \cdot \mathbf{2.6} = 1{,}965{,}600$ GJ (2.6 factor ref. guidance)
$E_i = 0.15 \cdot 28 \cdot 7{,}500 \cdot 3.6 = 113{,}400$ GJ

$$Energy\ Efficiency = \frac{1{,}965{,}600 - (23{,}949 + 113{,}400)}{0.97(2{,}394{,}900 + 23{,}949)}$$

$$Energy\ Efficiency = 0.779$$

Energy efficiency of Hooton Bio Power at 0.799 is significantly greater than the threshold of 0.65 so the facility is classified as R1 Recovery process under the waste Framework Directive.

Hooton Bio Power Project

Appendix 1 – Fire Prevention Plan

XXXXXX.XX.XXXX.XXX.XXXX

Issue Date
15.03.2019

REASON FOR ISSUE

☐ FOR ENQUIRY	☐ FOR REVIEW	☐ FOR APPROVAL
☐ FOR PURCHASE	☒ FOR INFORMATION	☐ FOR CONSTRUCTION

Rev	Date	Revision Description/Status	No. Pages	Prepared by	Checked by	Approved by
0	17.12.2018	Copy of Ince FPP		XXX	XX	XX
1	15.03.2019	BWSC update for Hooton		CNH	MRCH	MRC

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APPENDICES

- Fire Safety Strategy Report 2031.M0.J01.001.R2
- Site layout drawing 2031.D2.001.001
- Layout drawing – Fire main / Hydrant location 2031.M0.J01.001
- Firefighting Containment Volume Design 2031.CS.751.010 (Fairhurst)
- Drainage specification – 2031.CS.701.000 (Ramboll)
- Drainage specification – 2031.CS.751.000 (Fairhurst)
- 2031.C0.701.001 Enabling Works - Proposed Drainage Layout - Sheet 1
- 2031.C0.701.002 Enabling Works - Proposed Drainage Layout - Sheet 2
- 2031.C0.706.001 Proposed Drainage Outfall - Surface water - Sheet 1
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- 2031.C0.750.000 Site Drainage. Overall Layout
- 2031.C0.750.001 Site Drainage. Surface Water. Sheet 1
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- 2031.C0.750.004 Site Drainage. Surface Water. Sheet 4
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- 2031.C0.750.011 Site Drainage. Foul & Trade Effluent. Sheet 1
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- 2031.C0.780.004 Site Utilities. Fire Main. Sheet 4
- 2031.C0.780.005.Site Utilities. Fire Main. Sheet 5

1.0 Site Description

1.1 SITE ACTIVITIES

The Hooton Bio Power Project is a dual line waste to energy Power Plant, which at full load, generate approximately 24 MW electrical power to the grid. The fuel for the Power Plant will be a mix of e.g. municipal waste and industrial waste. The Power Plant infeed fuel requirement at full load is some 30 tonnes per hour (15 tonnes per hour per line).

The Power Plant is designed to provide an enclosed process, from delivery, processing and storage of the feedstock, steam production in the boiler to the steam turbine generator set and finally electrical distribution.

Fuel is delivered to the plant waste fuel unloading area (feedstock receiving area) and unloaded into the reception bunker by truck. From here it will be transferred by crane into one of two shredders which reduce any received fuel to a homogeneous size. From the shredders the fuel is screened for non-combustible materials followed by conveying it to the Waste Fuel Storage Area (Feedstock storage area). In the waste fuel bunker the fuel is mixed and finally transferred to the receiving hoppers for the boilers for combustion.

The site houses three steel framed metal clad steel structures for the waste reception / storage building, boiler/gasification building and the turbine building, a concrete building for the electrical annex and a separate concrete/brick admin building. There is also a separate concrete/brick built SPEN 33kV sub-station.

1.2 LOCATION PLAN

1.2.1 Physical Location

The Works are located at: Hooton Bio Power Project, North Road, Eastham, Wirral, CH65 1AJ.

Plot 9A (Biomass Energy Plant), Ince Resource Recovery Park, Grinsome Road, Ince, Cheshire Grid ref: 346761, 376593 as detailed in 190200-G-SKT-001 – FPP Location Plan.

1.2.2 Local Community/Infrastructure

As detailed on the FPP Location Plan, there are limited sensitive receptors within 1km of the site. Other receptors are included in the map appended to this document, reproduced from the Air Quality Assessment produced by Fichtner Consulting Engineers.

The following workplaces have been identified around the site:

- CF Fertilisers UK (formerly GrowHow; Fertiliser Plant)
- Encirc Glass (Glass Factory)
- SPEN Sub-station (although this is an unmanned facility)
- Drainage Pumping Station (although this is an unmanned facility)

None of the above workplaces would be impacted by an incidents occurring on the site. Close relationships has already been established with CF Fertilisers UK since the Fertiliser Plant is a COMAH site and has an emergency action plan for the surrounding area in case of an ammonia release. The control room within the biomass plant has been designed as a safe gas refuge area in case of an alarm being raised by the Fertilisier Plant. The induction procedures will contain the special requirements associated with the neighbouring CF Fertilisers COMAH site.

The only infrastructure on the edge of the 1km zone is the branch railway line to Birkenhead. This is should not be impacted by any incident occurring on the site.

To the North of the 1km zone there is the Manchester Ship Canal. It is proposed the treated waste water will discharge to a local watercourse. On failure of the treatment plant, the untreated waste will be stored in a retention tank and disposed of by road tanker.
The closest residential area of Elton is over 1km from the site. This residential area should not be impacted by any incident occurring on the site.

1.3 SITE PLAN

The Site Plan is shown on 2031.D2.001.001 – FPP Site Plan.

The walls between the fuel storage building/boiler building/turbine building are designed for a 2hr fire rating. The electrical annex is sectioned into several fire compartments designed for a 2hr fire rating. The SPEN sub-station has a 2hr fire rated structure.

The Site Plan shows locations of hazardous materials. These include the following external facilities:

- Diesel storage tank in bunded area;
- Diesel emergency generator tank;
- Containerized fire pump diesel tank;
- 33kV transformer oil;
- UREA storage tank;
- Active carbon storage tank;
- Lime storage tank;
- Two ash silos;
- Vacuum cleaning unit;
- CEMS compressed gas cylinders including hydrogen;

Within the boiler building there are the following hazardous materials:
NaOH (concentration < 25%);
NH4OH (concentration < 25%);
Hydraulic oil (fire retardant FM approved/UL listed);

Within electrical annex WTP room there are the following hazardous materials:
Water Treatment Chemicals including Anti scalant, Active carbon, Ion exchange resin;

The site has been designed for one main site entrance to the South East sufficiently sized to allow emergency vehicles to access at all time.

A combined sprinkler and hydrant fire water storage tank holding 680 m3 of fire water is installed on the plant for 2 hour operation of the containerized fire pump unit. Both the fire water storage tank and the containerized fire pump unit is designed according to NFPA. The tank is shown on the site plan.

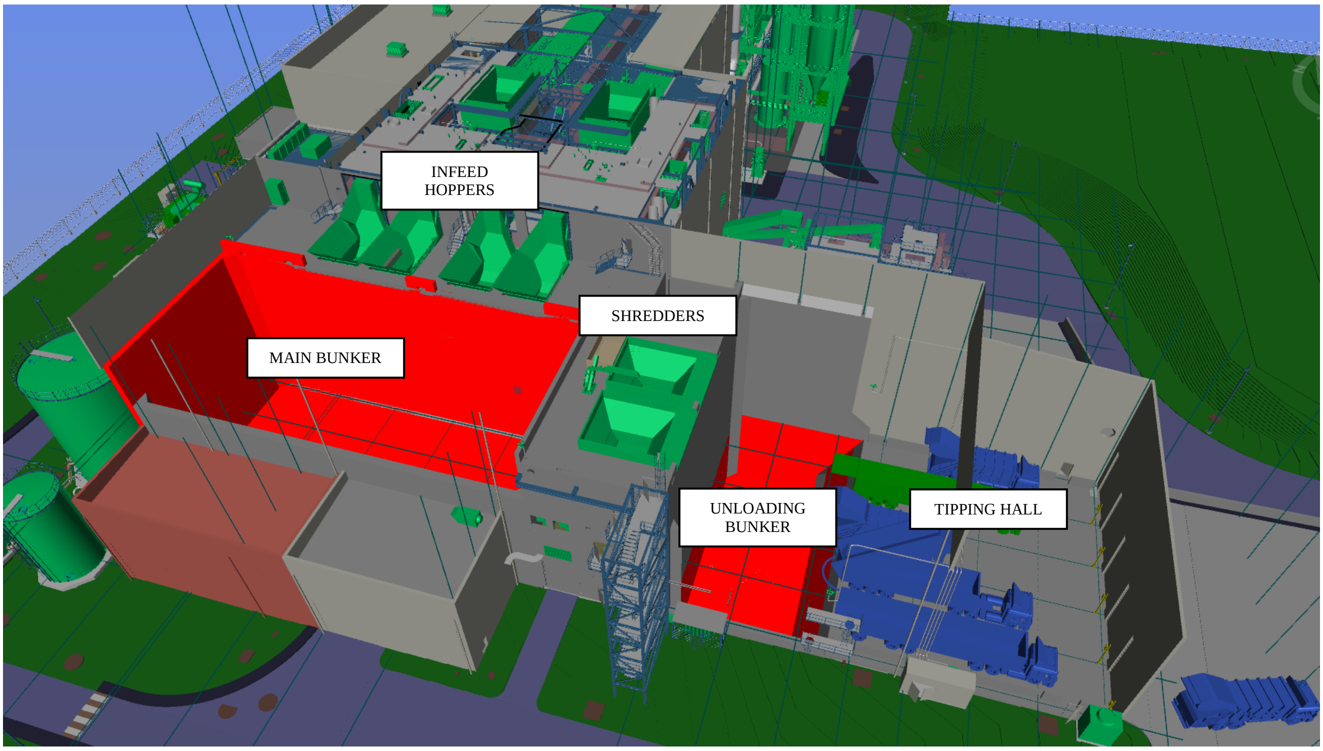
There are 5 drainage systems on site:

- Surface water which is collected through the road drainage system via an oil separator lead to the attenuation pond and finally discharged to Manchester Ship Canal.
- Surface water which is collected from process building roofs and lead to a rain water harvesting collection tank (SUDS) with overflow to attenuation pond.
- Foul water drainage from electrical annex building, administration building and local tea kitchen and toilet blocks lead to a central pump station discharging to public sewer off site.
- Process water for re-use which will be returned to the process with excess overflow to process water system.
- Process water, where unable to reuse (hot or excessive quantities) collected at equipment and pumped to the Sedimentation basin for treatment. Finally discharged to the foul drainage system.

The drainage plans, are included.

2.0 Preventing Fires

Preparation and screening of the feedstock to safeguard compliance with the fuel specification will be undertaken externally at a waste transfer station and supplied/delivered to the reception tipping hall/unloading bunker of capacity up to 938 tons representing a maximum of 1.3 days' operation of the plant. The feedstock will continuously be conveyed from the unloading bunker to the main bunker of a capacity up to 2,976 tons representing 4.1 days' operation of the plant.



The attached checklist summarized from the Environment Agency Fire Prevention Plan Guidance document detailed below describes how the project addresses each of the issues identified.

2.1 MATERIAL STORAGE

Item	Yes/No	Comments Actions
Do you have combustible, flammable and other flammable materials including cylinders on your site?	Yes	Municipal waste and industrial waste, Compressed gas for CEMS instrument, Diesel Oil. A detailed DSEAR reports will be issued.
Does your management system describe how you manage the quantity and type of material you intend to stockpile including seasonal and market variations	Yes	The feedstock storage is limited to the unloading bunker and the main bunker capacity. The feedstock will prior to delivery to the plant have been undergoing screening for oversized and of spec materials.
Is the location and duration of the stockpile appropriate	Yes	Limited quantity at site in enclosed storage area adjacent to end use

Do separation distances between stacks and/or other risk reduction measures on site meet the requirements of your local FRS	Yes	The feedstock storage area is either spatial separated from adjacent buildings or separated by 120 minutes fire walls. The area will be monitored by CO detection system for early warning and additionally installed with thermal cameras. Both the unloading bunker and the main bunker are installed with water monitors for fire extinguishing. Firewall separation and Please refer to the Fire Safety Strategy Report appended for further detail (2031.M0.J01.001.R2, section 8)
Have you contacted your local FRS about stack layout design and fire-fighting strategy	Yes	Through building control, the local FRS has reviewed and commented the Fire Safety Strategy Report.
Have you considered fitting an automatic fire detection and suppression system	Yes	Please refer to the Fire Safety Strategy Report appended for further detail. (2031.M0.J01.001.R2, section 5)
Are stock piles stored in excess of 3 months	No	There is a maximum 4 days turnover of the main bunker during normal operations. Cranes installed to feed the boilers will be programmed to collect fuel in a certain pattern and thereby not leaving areas inside the main bunker unattended for long periods. During planned outage for overhaul and maintenance fuel bunkers will be leveled to a minimum. Fire detection and water monitors will at all time normally be in place and operational.

2.2 PERSONNEL SAFETY

Item	Yes/No	Comments/Actions
Does your site have suitable first aid, fire-fighting equipment and training for staff	Yes	The operation and maintenance contractor will have procedures in place prior to commercial operation of the plant.
Are all means of escape for your staff adequate	Yes	Comprehensive review undertaken at design stage to meet Building Regulation requirement and BS 9999
Do you have a plan in place to raise the alarm and evacuate workers	Yes	Automatic Fire alarm system installed and fire evacuation plan and training will be developed prior to start up.

2.3 ACCESS

Item	Yes/No	Comments Actions
Have you provided suitable access for fire fighting vehicles	Yes	Yes – good access to all buildings with loop road. A swept path analysis will be carried out for FSR and other heavy vehicles on site.
Have you assessed potential fire spread on and around the site	Yes	Fire spread between buildings, internally inside buildings and external towards site boundary has been addressed and the plant has been designed accordingly. Preventing the risk fire spread is achieved either by compartmentation, fire walls, spatial separation or installed fire suppression systems. Please refer to the Fire Safety Strategy Report appended for further detail (2031.M0.J01.001.R2, section 8)
Have you considered where best to park up machinery at night to allow access for fire plan procedures or to minimize risk of loss in the event of fire	Yes	The site allows for various locations outdoor for parking machinery. Staff vehicles will be parked in the parking spaces shown on the appended site layout.
Have you considered what site security is required to prevent arson or vandalism	Yes	Site boundary will be fenced (2.4 m high). The entrance to site is through the gate. During day shift any visitor will be registered at the guardhouse. At night shift the gate will be kept closed. The site entrance will be monitored by CCTV as well as the main process areas.

2.4 CAN ANY OF THE FOLLOWING AFFECT ACCESS TO AND ROUTES AROUND SITE

Item	Yes/No	Comments Actions
Prevailing Wind causing smoke and fumes around access areas and routes to your	No	
Rough terrain	No	None
Buildings Debris	No	None
Security/Fencing	Yes	Security gate will be closed by end of business. Control room will be manned 24/7 and can be reached from gate via intercom.

2.5 ENVIRONMENTAL CONSIDERATIONS

Item	Yes/No	Comments Actions
Do you have a drainage plan for your site	Yes	Appended
Do you know which local surface waters, groundwater and/or sewage treatment works firewater run-off will flow to and how they may be affected by firewater run off	Yes	See appended "Firefighting Containment Volume Design". Any fire water collected would be tankered off site.
Are firefighting water supplies adequate on your site and are suitable open water supplies available and accessible,	Yes	A combined sprinkler and hydrant fire water storage tank holding 680 m3 of fire water is installed on the plant for 2 hour operation of the containerized fire pump unit.
Are the location of hydrants and their flow rates marked on your site plan even if outside the site boundaries	N/A	Fire main layout with location of hydrants appended. Design flow rate for hydrants is 500 gpm (1,890 l/min). Please refer to the Fire Safety Strategy Report appended for further detail (2031.M0.J01.001.R2, section 16.19)
Do you have adequate plans, equipment and facilities to contain firewater	Yes	See appended "Firefighting Containment Volume Design".
If firewater cannot be contained is a controlled burn a safe option	N/A	
Is a controlled burn also the best option for air quality and fire fighter safety?	N/A	
Do you know which properties and residential areas surrounding your site may be affected by smoke?		Rural area surrounded by Farm Land
If the answer to the above is yes then is there a plan to tell people living there what to do e.g. keep doors and windows shut.		Development is on farmers land.

2.6 MAINTENANCE CONSIDERATIONS

Item	Yes/No	Comments Actions
Does the equipment get regularly maintained	Yes	The operation and maintenance contractor will maintain detailed maintenance plans for all plant on site as per regulation.
Are certificates in place for all electrical equipment	Yes	Equipment required to be certified according to e.g. IEC, PED, CE etc. will comply.

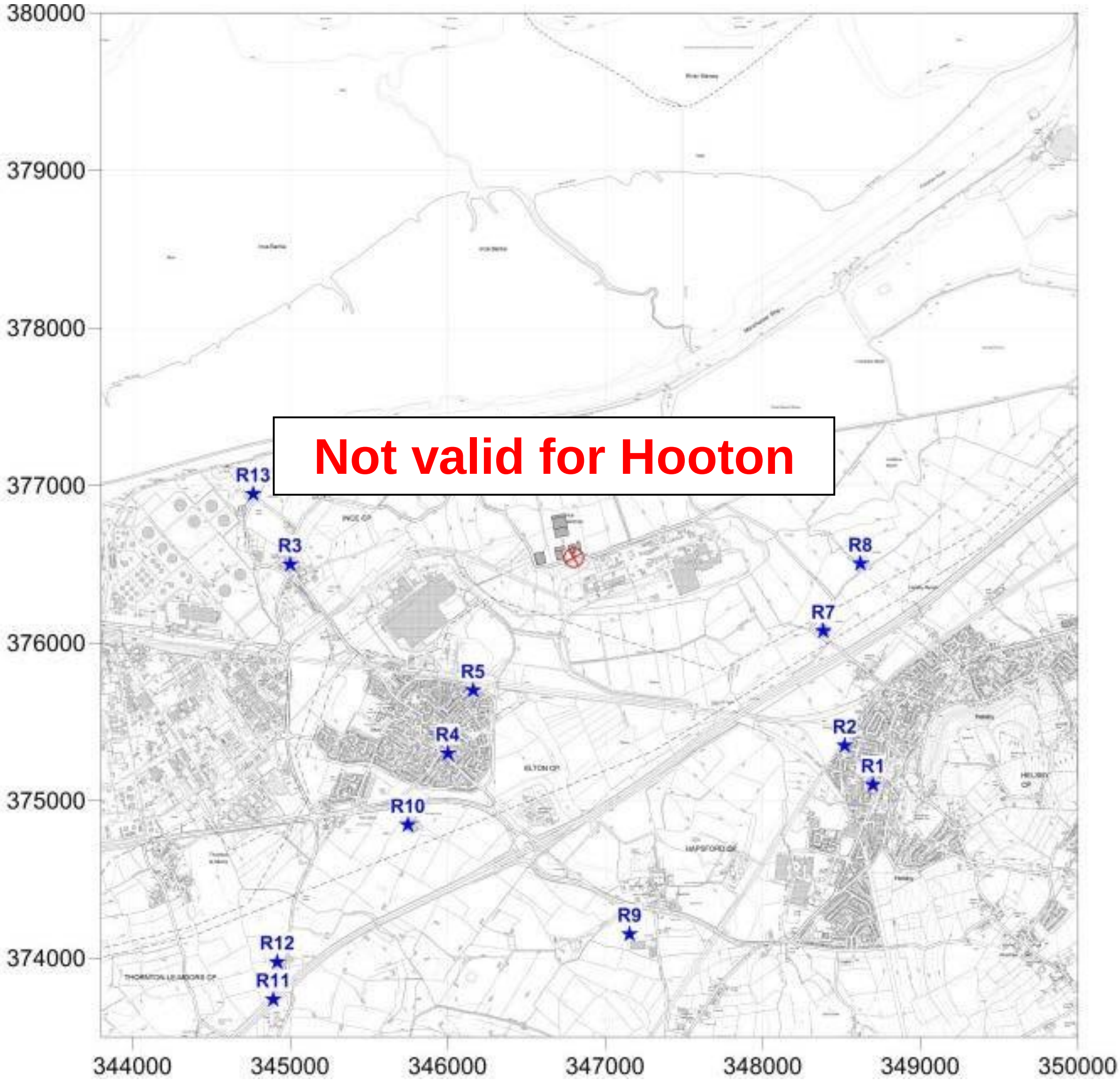
3.0 Reducing the impact of a fire

As detailed in section 2.0, the timber preparation will be undertaken externally on another parts of the landowners site and supplied delivered to a reception tipping hall with a maximum of 4 days' supply to allow for bank holidays. Under normal operation 1 to 2 days' supply will be kept on in the reception hall.

Item	Yes/No	Comments Actions
Does the site have a waste acceptance procedure for non-permitted, incompatible waste or hot loads	Yes	Non-permitted, incompatible Feedstock or hot loads is visually inspected and monitored by thermal cameras during unloading into the bunker. Off-spec feedstock will be back-loaded into containers and removed from site. The installed fire water monitors is available for handling hot loads.
Is there a permitted Waste Acceptance		EWC codes from permit will be agreed
Is there waste treatment on site	Yes	Feedstock is delivered to the Unloading bunker and from here it will be transferred by crane into one of two shredders which reduce any received fuel to a homogeneous size. From the shredders the fuel is screened for ferrous metals followed by conveying it to the main bunker.
Has the site defined the waste storage separation distances	No	Not applicable as building is fitted with automatic fire detection and suppression, is manned 24/7 and has an enclosed building with appropriate fire walls to sensitive areas.
Are Fire Walls used to separate waste	No	The feedstock is stored in the main bunker. Fire walls are installed for separation of key plant areas.
Is there a Quarantine Area for the waste	No	Off-spec feedstock will be back-loaded into containers and removed from site.
Is there a fire suppression system for the storage area	Yes	Fire water monitors are installed for firefighting in the bunkers. The unloading bunker and the main bunker are both covered with two monitors installed to assure any surface area in each bunker can be reached by two water streams.
Is there an active fire-fighting procedure for the site	Yes	The operation and maintenance contractor will have procedures in place prior to commercial operation of the plant.

Is there any contingency plans during an incident	Yes	The operation and maintenance contractor will have procedures in place prior to commercial operation of the plant. Please refer to the Fire Safety Strategy Report appended for further detail (2031.M0.J01.001.R2, section 17)

4.0 Sensitive Human Receptors

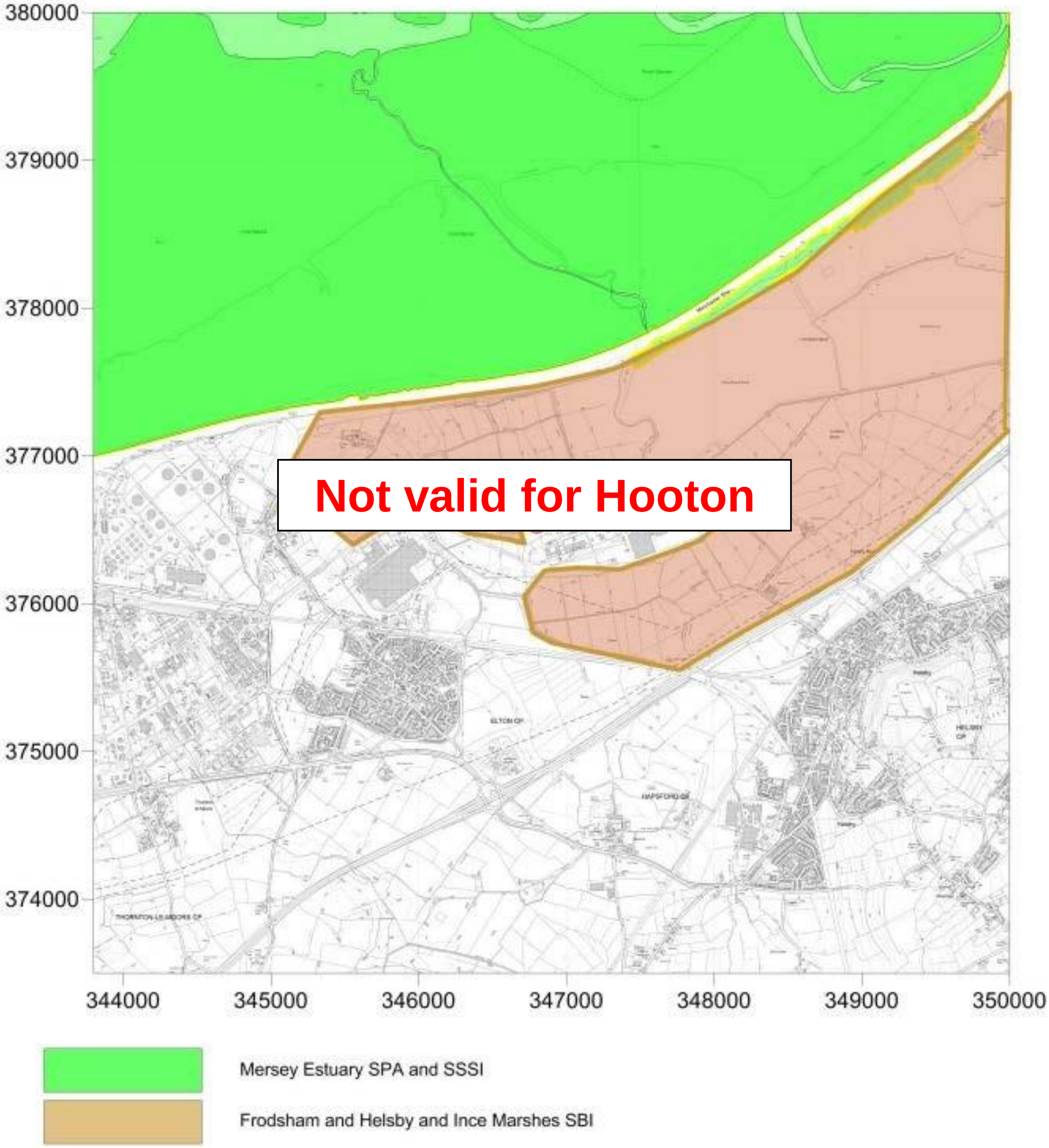


Reproduced from the 'Ince Marshes Biomass Renewable Energy Plant Air Quality Assessment for Environmental Permit Application' produced by Rosalind Flavell for Fichtner Consulting Engineers.

ID	Receptor Name	Distance from the Stack (m)
R1	Helsby	2,386
R2	Helsby 2	2,093

ID	Receptor Name	Distance from the Stack (m)
R3	Ince	1,801
R4	Elton	1,478
R5	Elton 2	1,058
R6	Kingsley	8,657
R7	Spring Farm	1,652
R8	Hill View Farm	1,820
R9	Jessamine Farm	2,415
R10	New Dairy Farm	1,997
R11	Thornton Green Farm	3,392
R12	Cryers Farm	3,182
R13	Hall Farm	2,075
R14	Holme Farm	1,356

5.0 Sensitive Ecological Receptors



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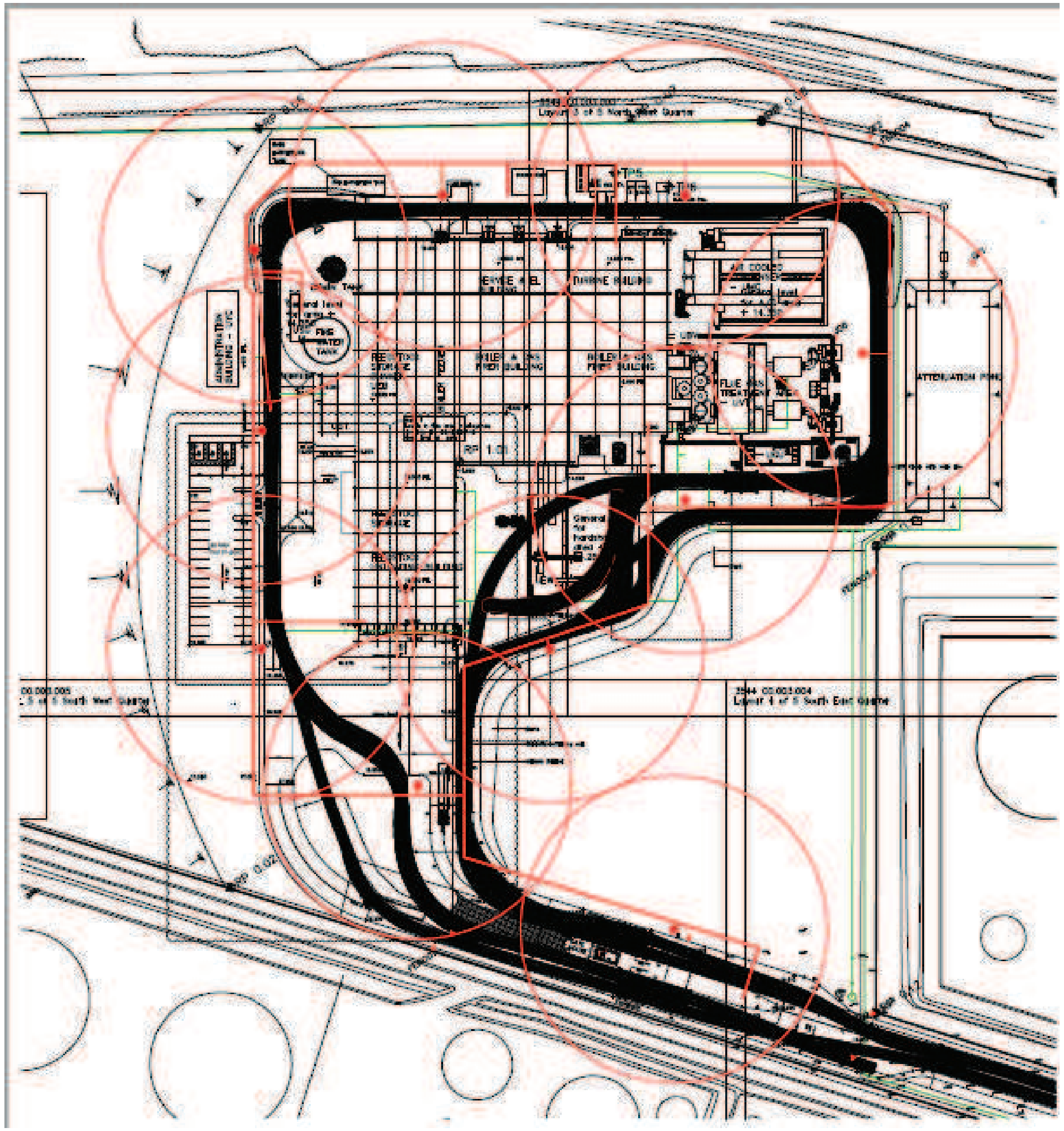
BWSC

Hooton Bio Power Project

Attachment to Fire Safety Strategy Report

Project:	Project No.	2031
Hooton Bio Power Project	Document No.	2031.M0.J01.002
	Revision:	2
	First issue:	October, 2018
	Last update	December, 2018



GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1					
0	2018.08.26	CNH	JEOH	FIRST ISSUE	MRC

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT: FIRE MAIN

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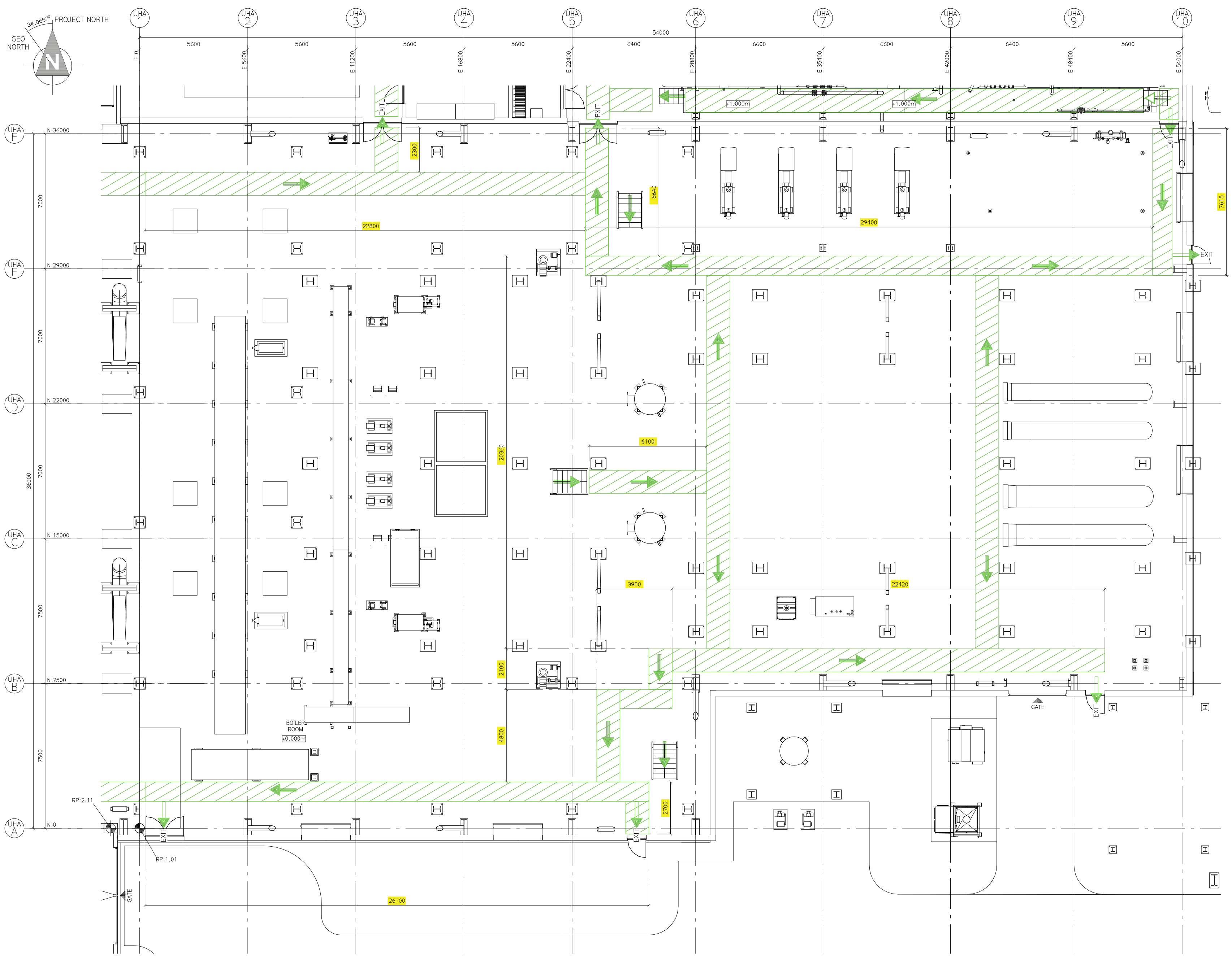

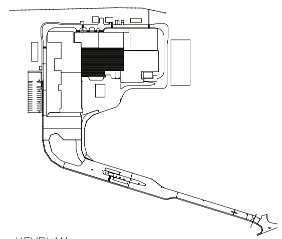

KEYPLAN

LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

EMERGENCY EXIT

GENERAL NOTES:

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NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

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PRELIMINARY

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0	2018.11.22	MAGAV			

OWNER:

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TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL +0.000m

SCALE:
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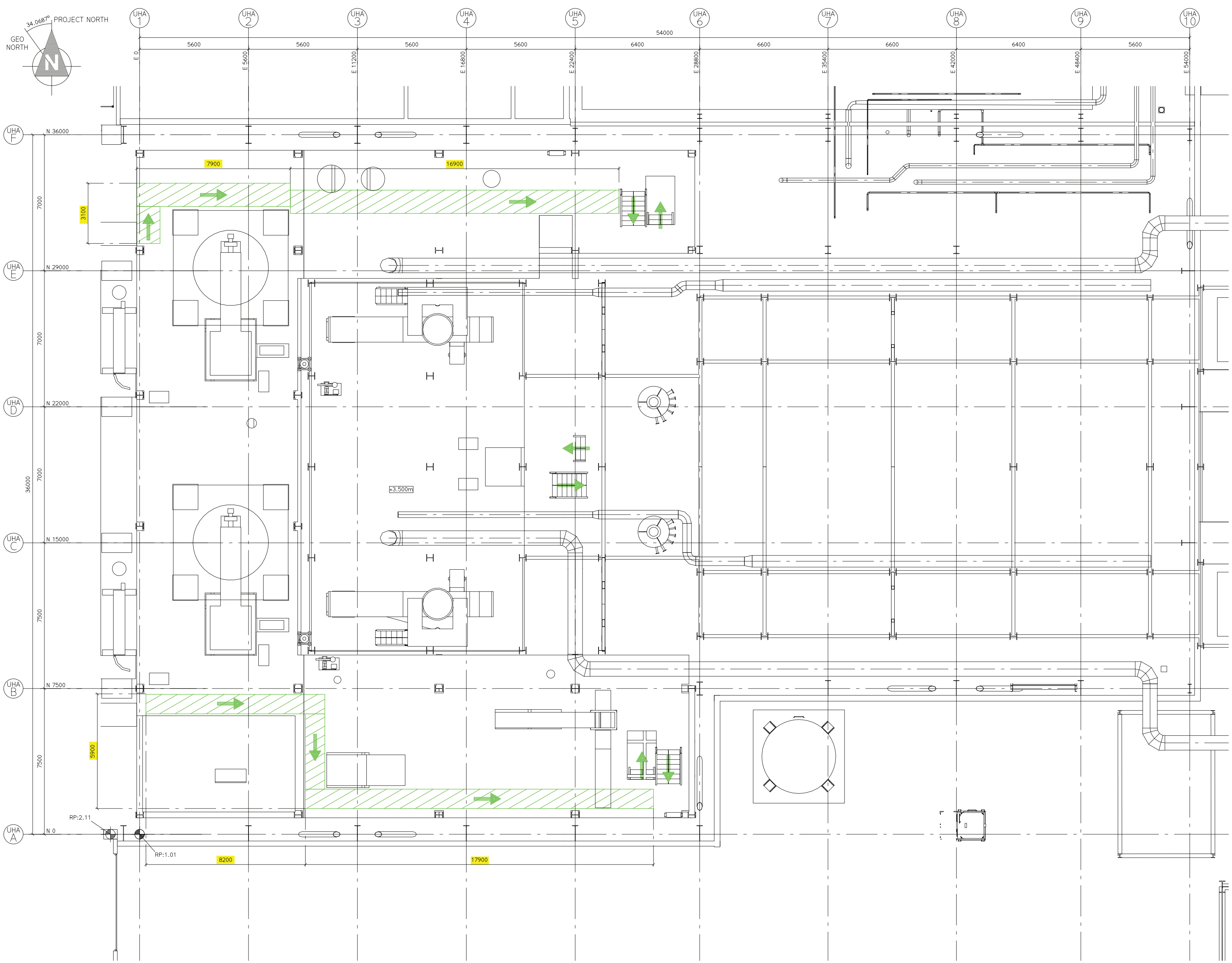

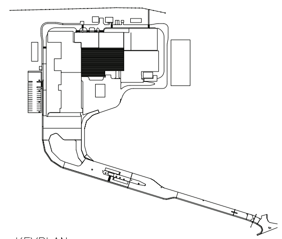

KEYPLAN

LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

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PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
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TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +3.500m

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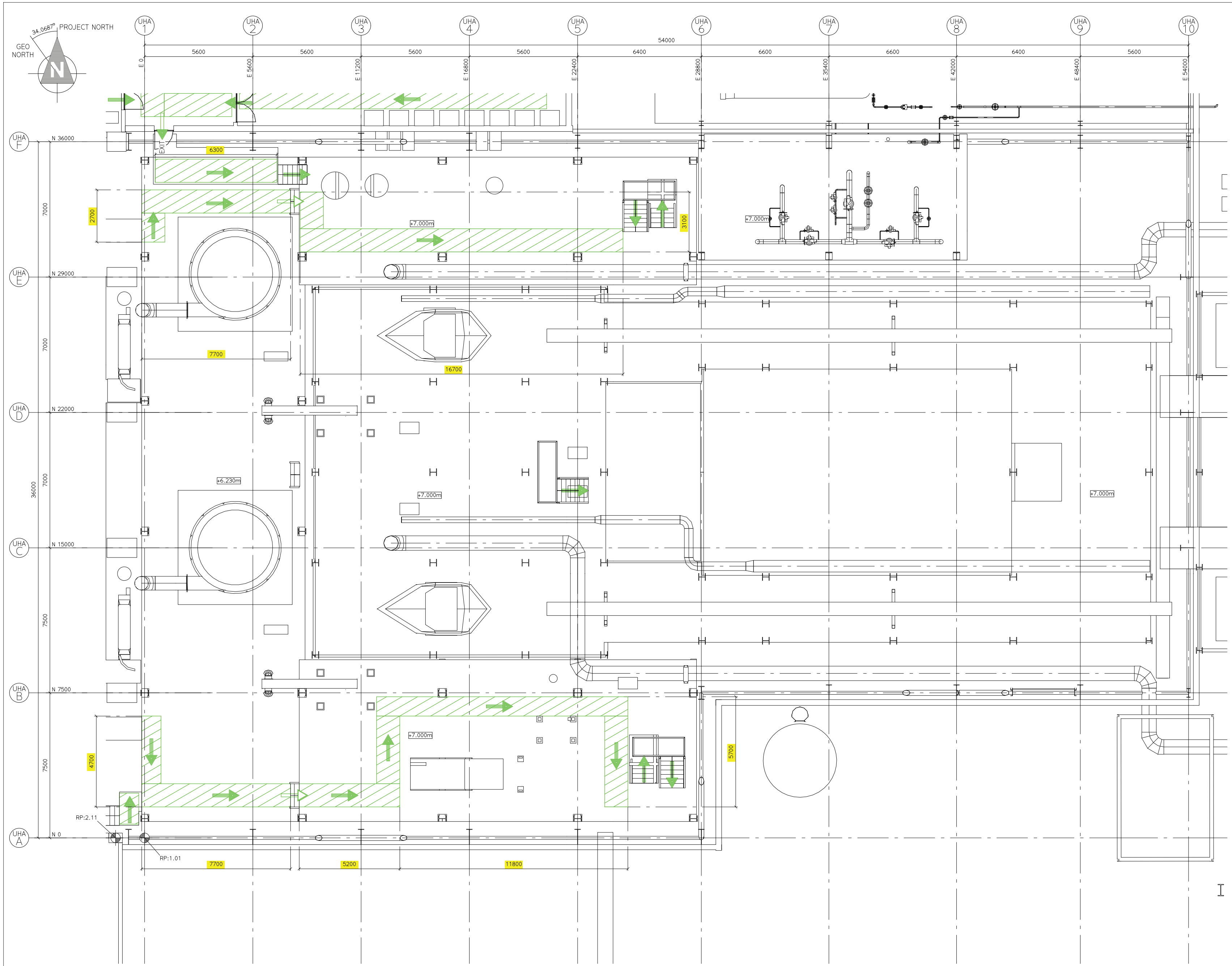

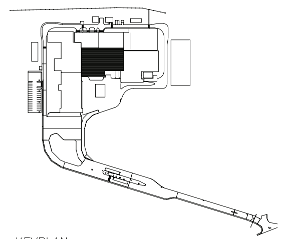

KEYPLAN

LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

EMERGENCY DIRECTION UP

GENERAL NOTES:

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NO.: 2. ALL LEVELS ARE RELATIVE IN METRE METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

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PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +7.000m

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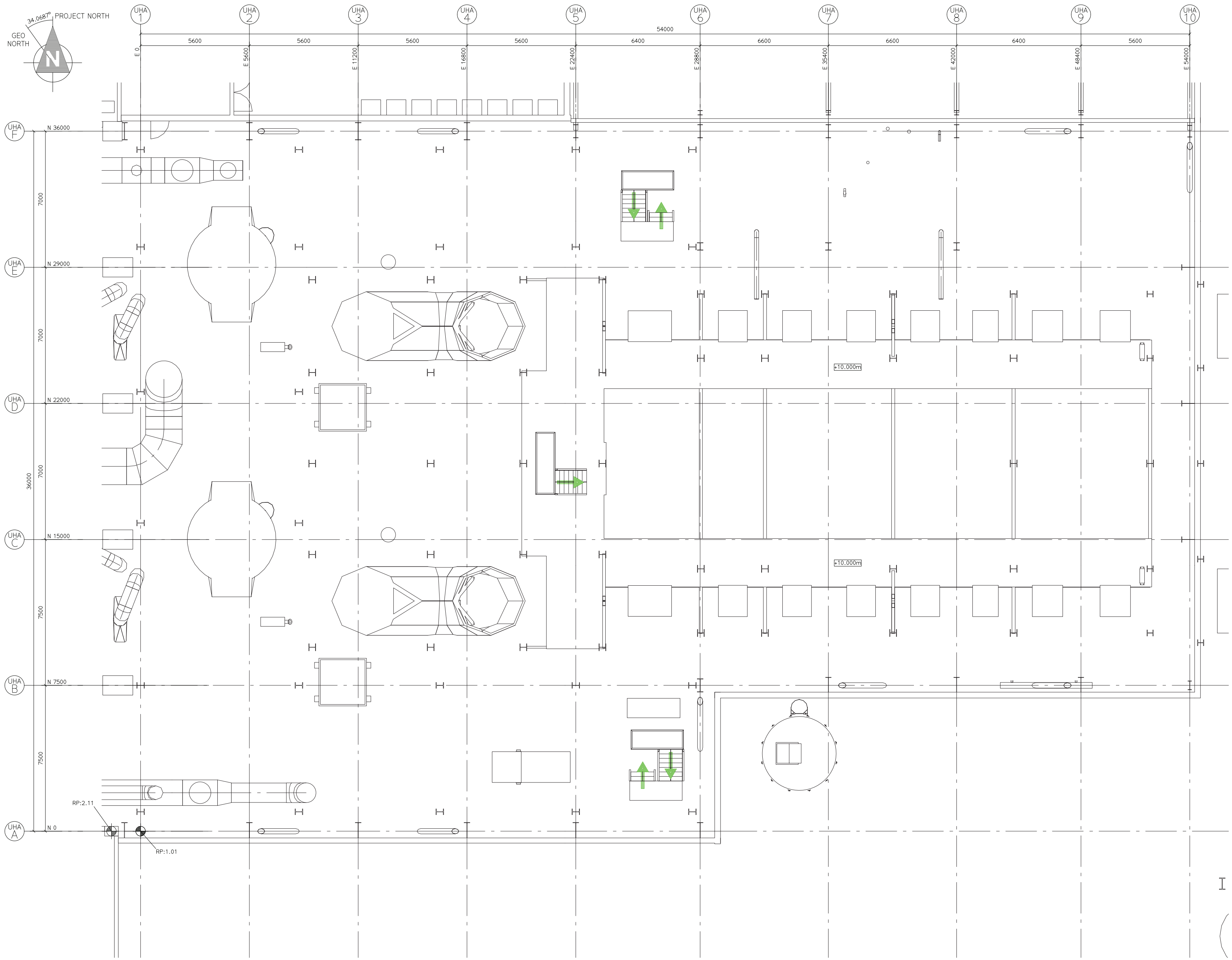

KEYPLAN

LEGEND:

EMERGENCY DIRECTION

GENERAL NOTES:

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NO.: 2. ALL LEVELS ARE RELATIVE IN METRE
METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +10.000m

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A3=1:200

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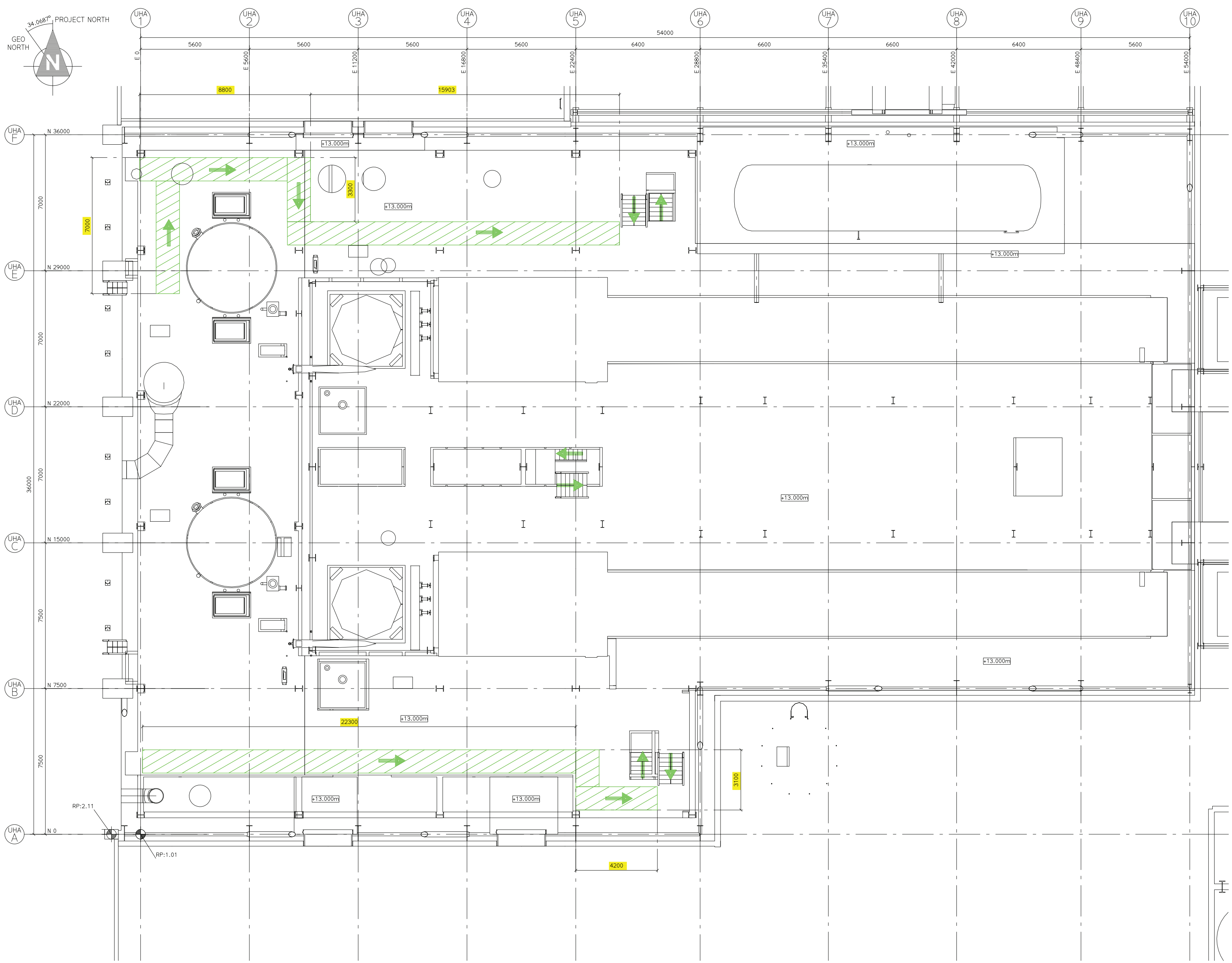
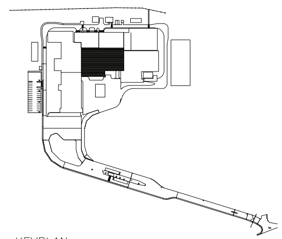
2031 : M4 . J05 . 104
PROJECT NO. GR. NO. SHT.

REV. 0




KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +13.000m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J05 105 (PROJECT NO. GR. NO. SHT.) REV. 0

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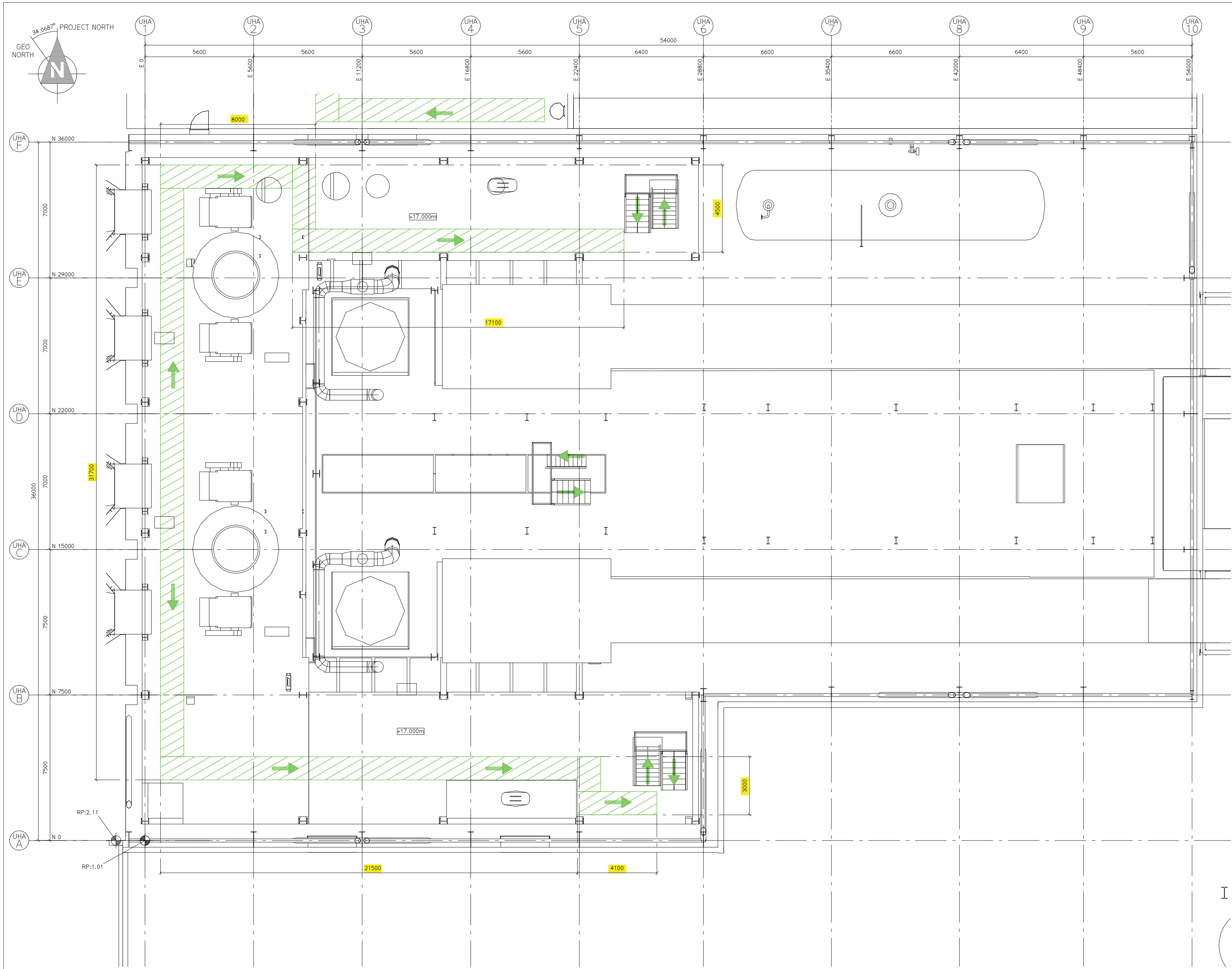

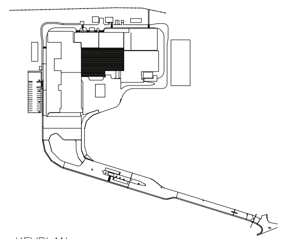

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE
METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +17.000m

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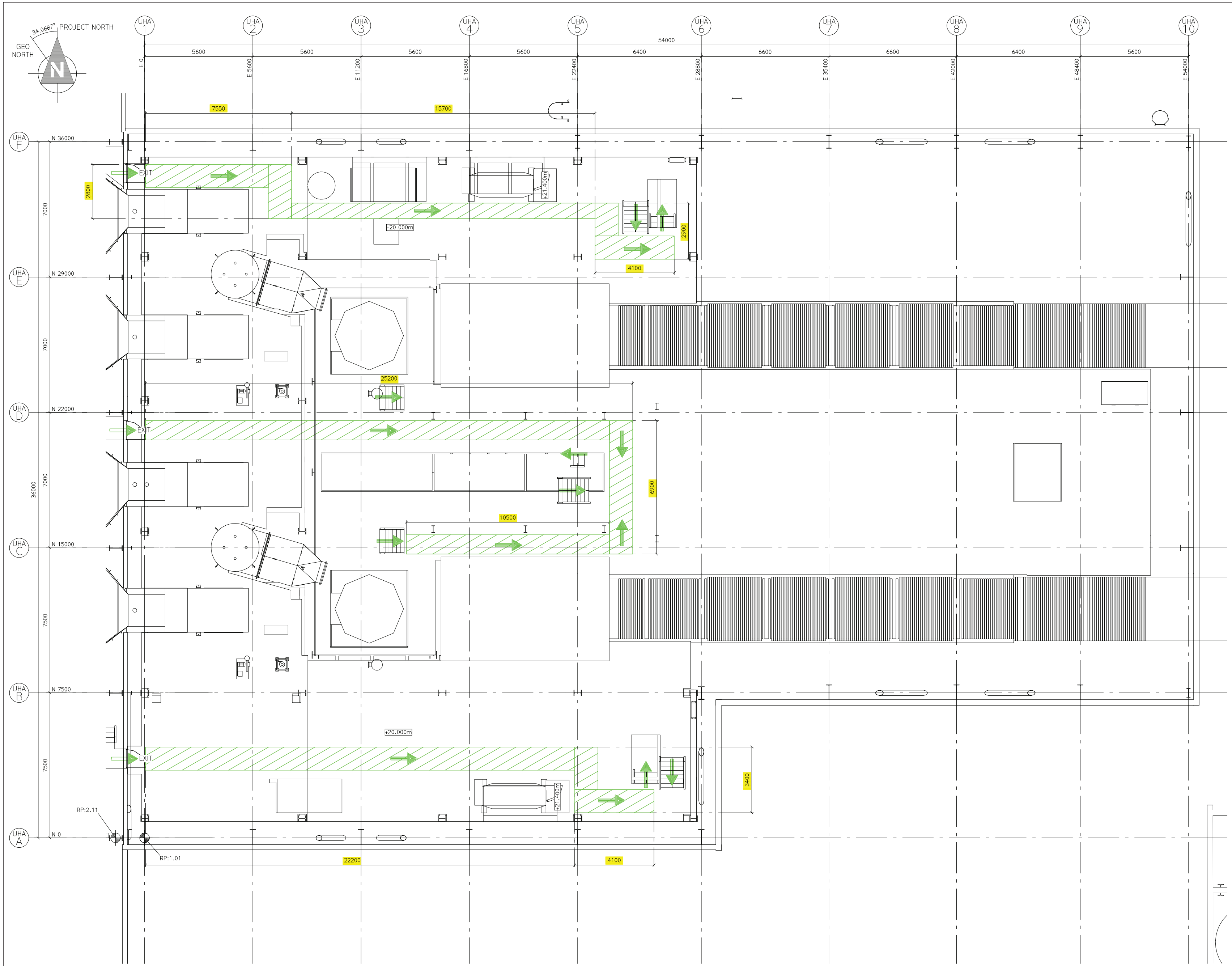
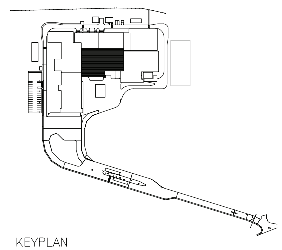
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.:
2031 ; M4 , J05 , 106
PROJECT NO. GR. NO. SHT.

REV. 0





KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +20.000m

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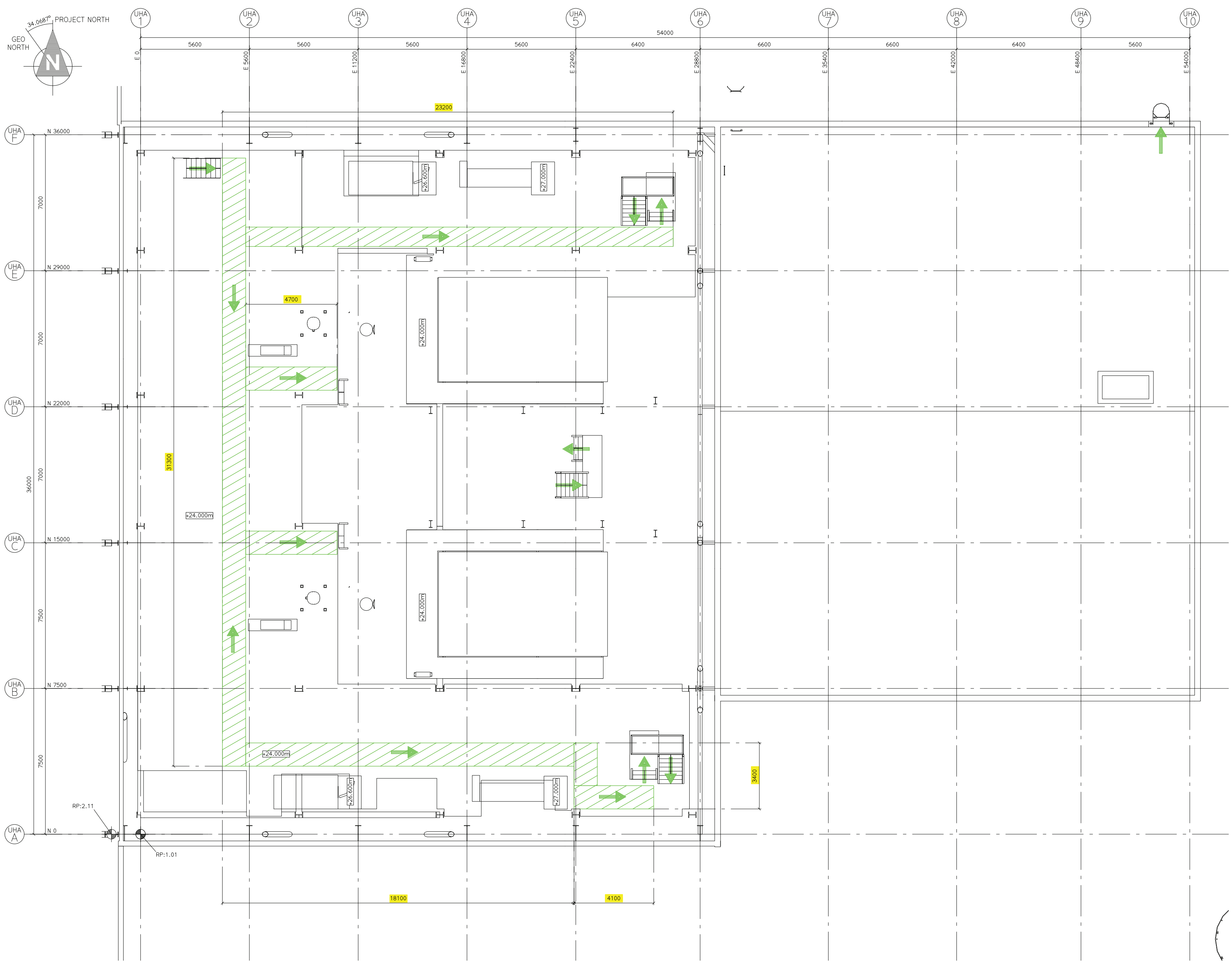
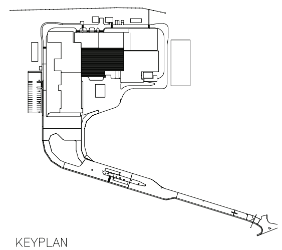
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 : M4 . J05 . 107 (PROJECT NO. GR. NO. SHT.)

REV. 0





LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +24.000m

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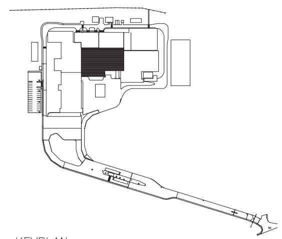
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.:
2031 ; M4 ; J05 ; 108
PROJECT NO. GR. NO. SHT.

REV. 0



KEYPLAN

LEGEND:

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL +27.750m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 : M4 . J05 . 109 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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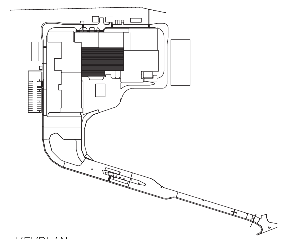

KEYPLAN

LEGEND:

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)

ESCAPE AND EGRESS ROUTES

PLAN VIEW, LEVEL +33.630m

SCALE:

A1=1:100

A3=1:200

BWSC DWG.NO.:

2031 ; M4 . J05 . 110

PROJECT NO. GR. NO. SHT.

0 REV.

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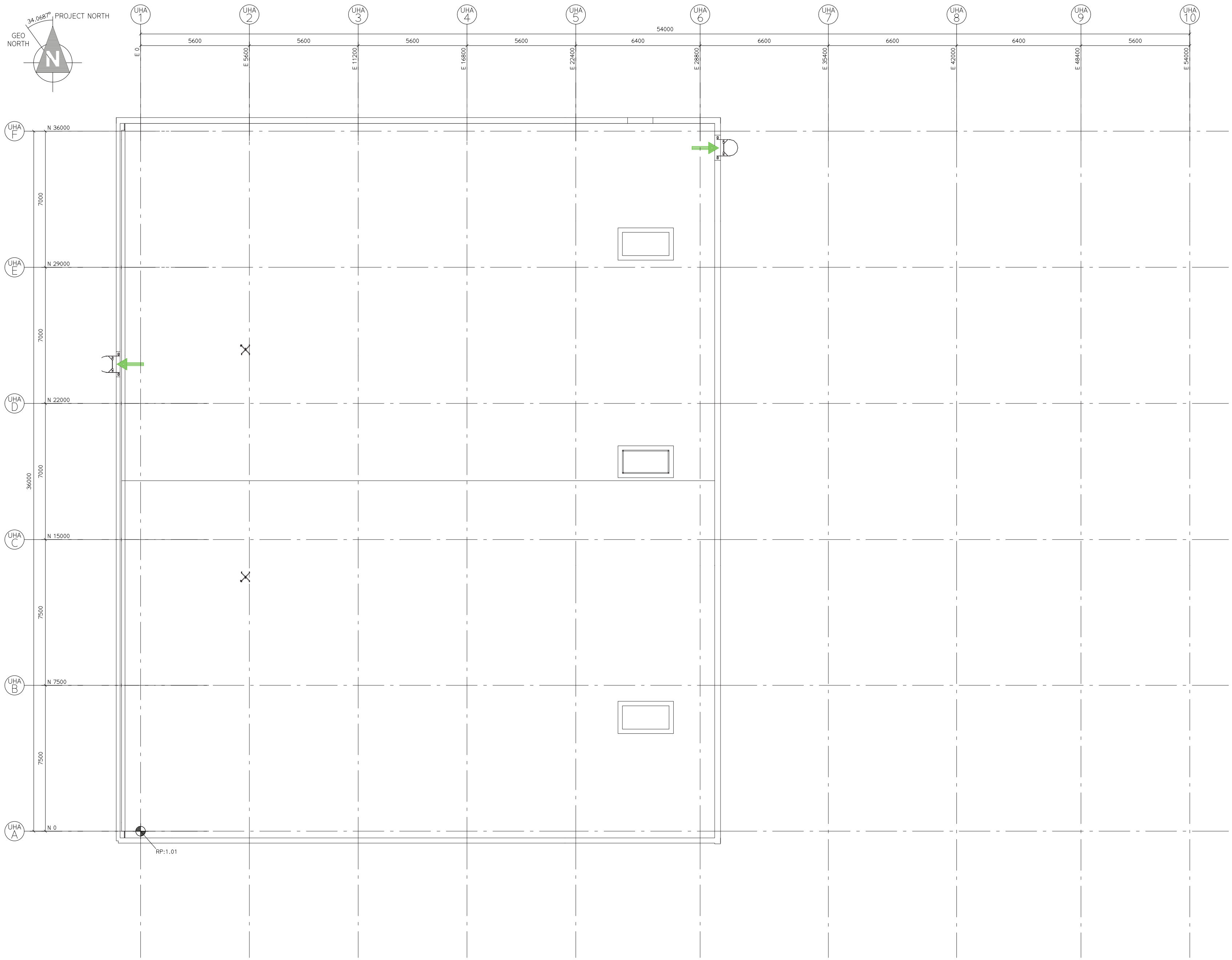

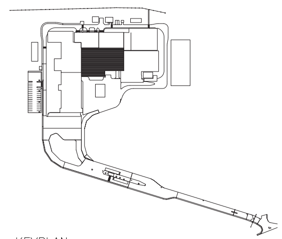

KEYPLAN

LEGEND:

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

BOILER BUILDING (UHA)
ESCAPE AND EGRESS ROUTES
MAIN ROOF PLAN

SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 : M4 . J05 . 111 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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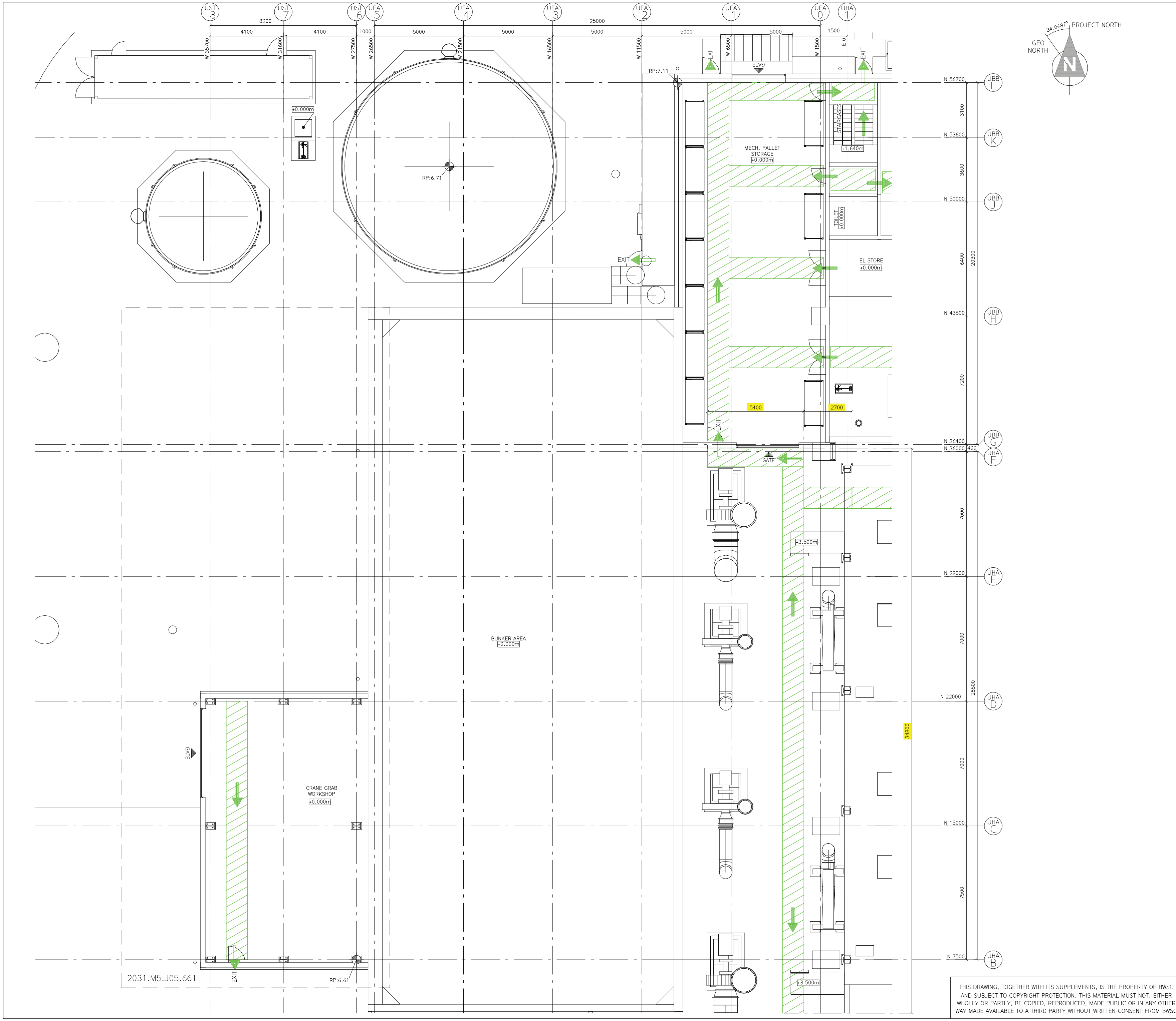

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT:
WASTE FUEL STORAGE AREA (UEB)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL +0.000m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 . M4 . J05 . 211 (PROJECT NO. GR. NO. SHT.)

REV. 0

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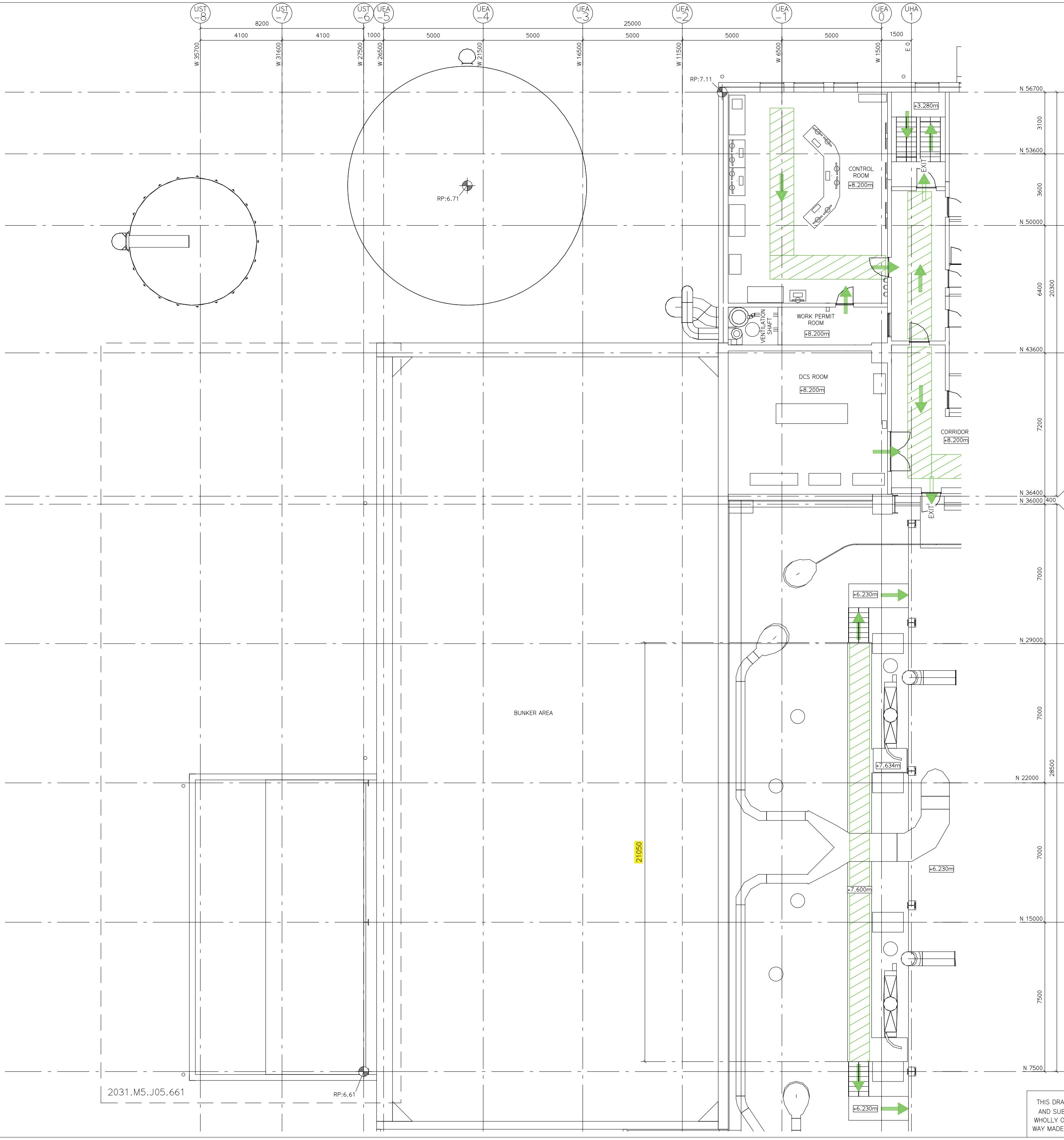

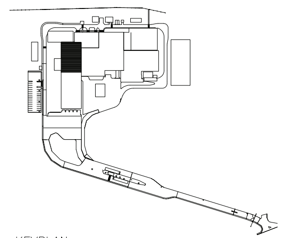

KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

WASTE FUEL STORAGE AREA (UEB)

ESCAPE AND EGRESS ROUTES

PLAN VIEW, LEVEL: +8.000m

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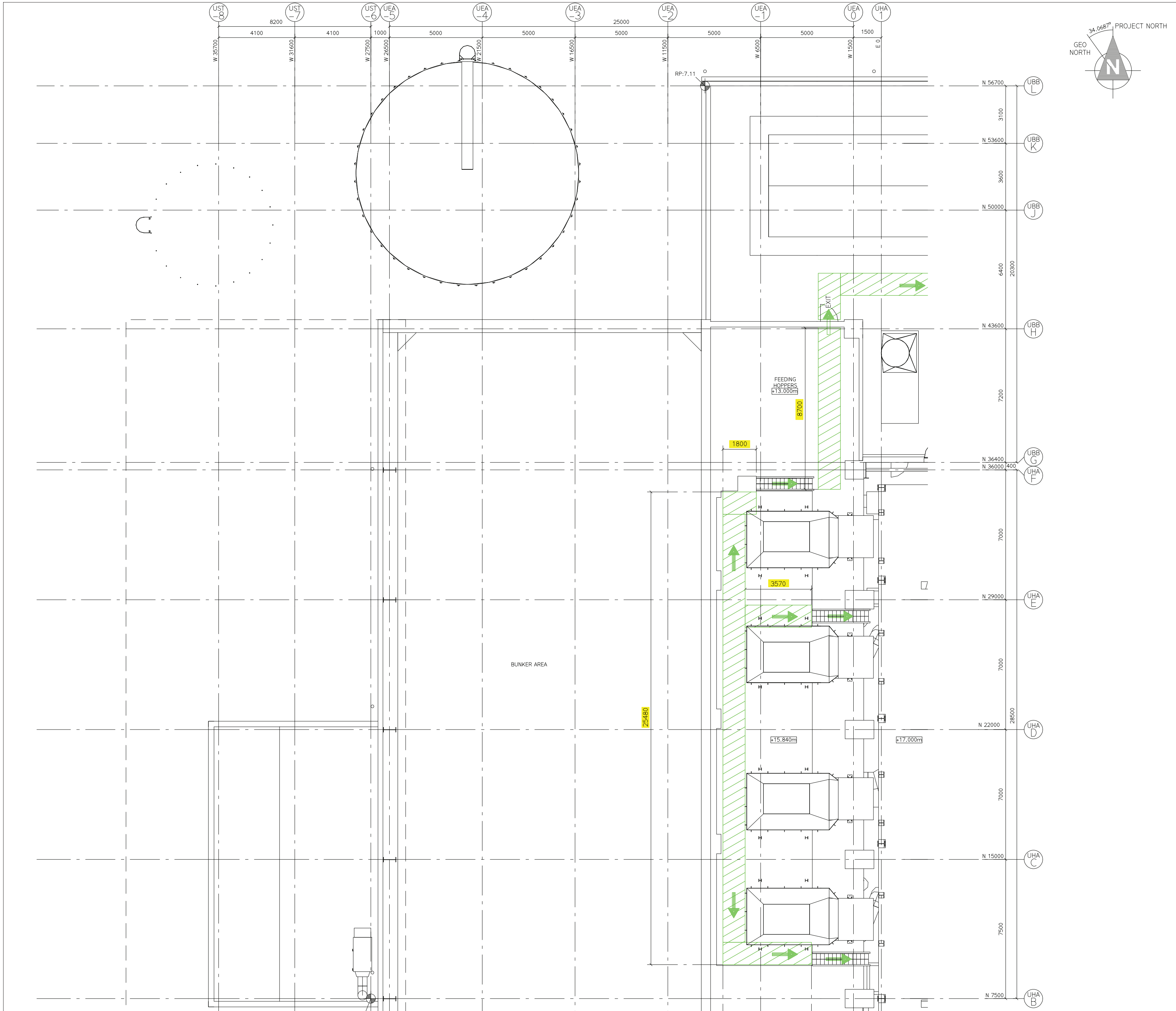
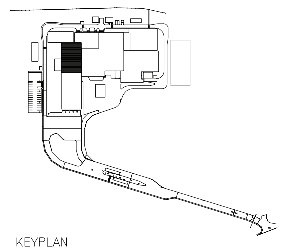
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 . M4 . J05 . 212 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0





LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

WASTE FUEL STORAGE AREA (UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +13.000m

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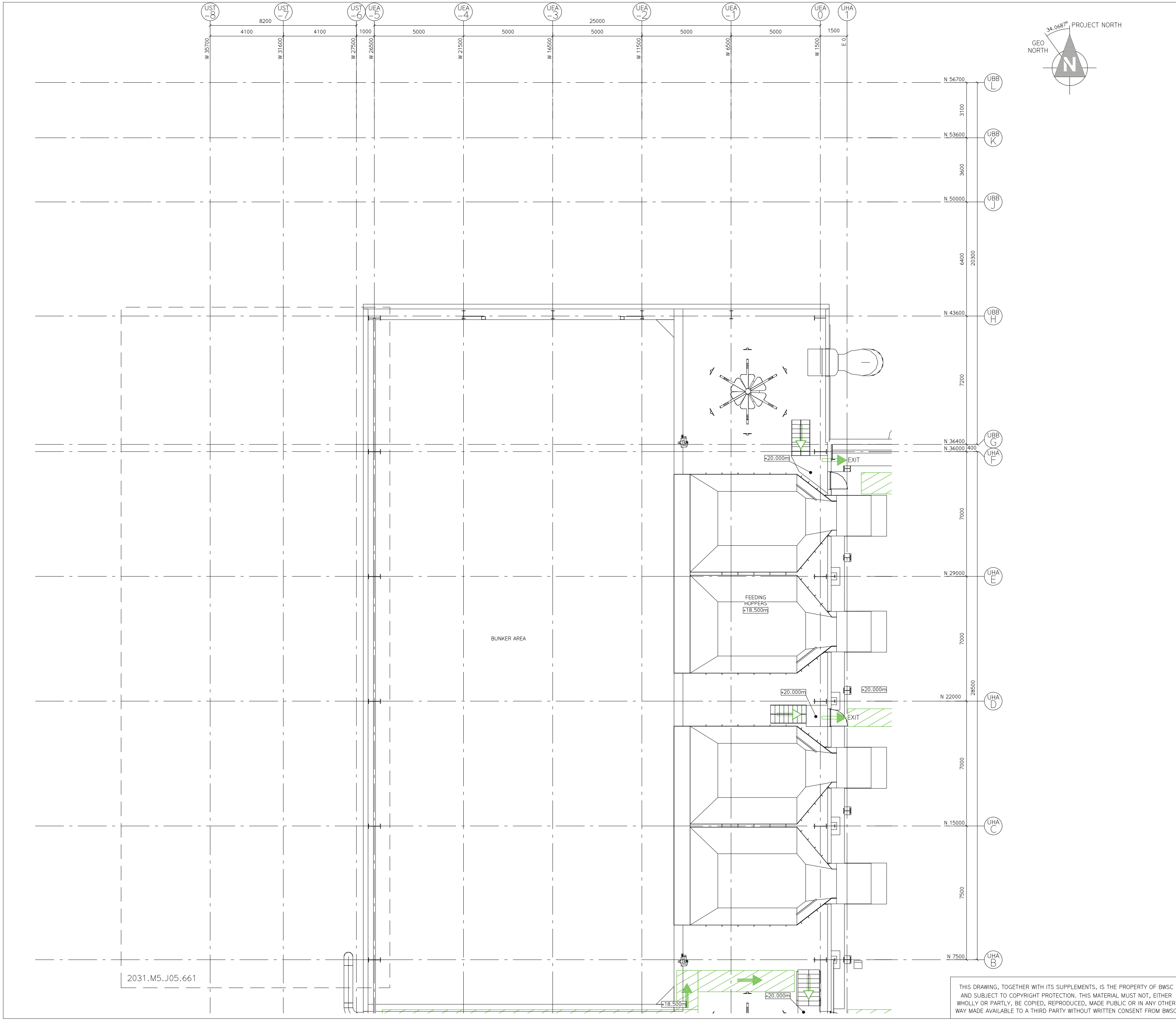
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 (PROJECT NO.) M4 (GR.) J05 (NO.) 213 (SHT.)

REV. 0



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

WASTE FUEL STORAGE AREA (UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +18.500m

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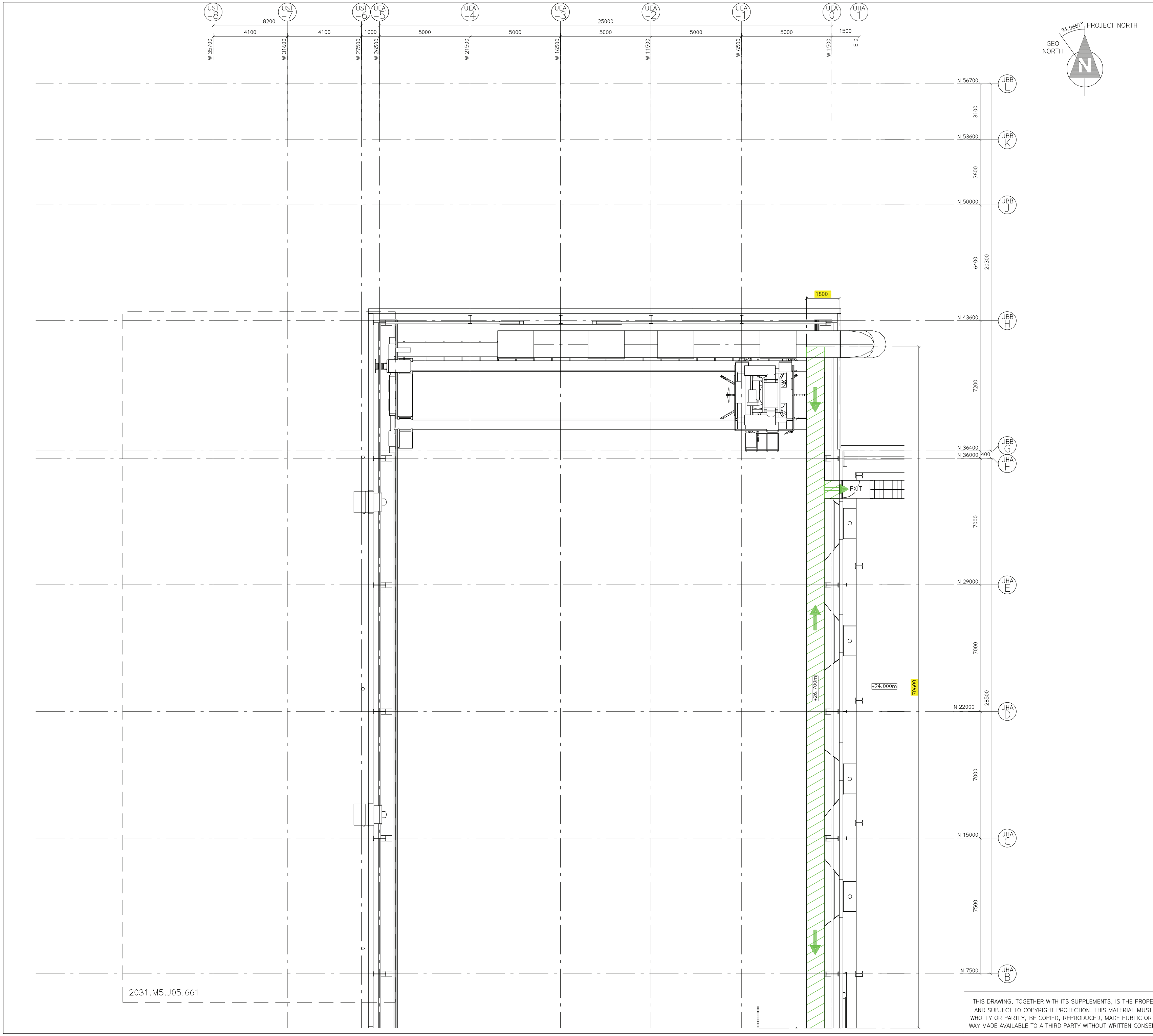
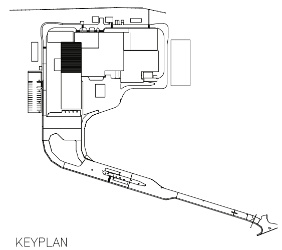
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031.M4.J05.214 (PROJECT NO. GR. NO. SHT.)

REV. 0





LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:
WASTE FUEL STORAGE AREA (UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: TOP OF CRANE

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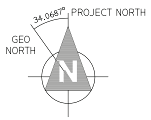
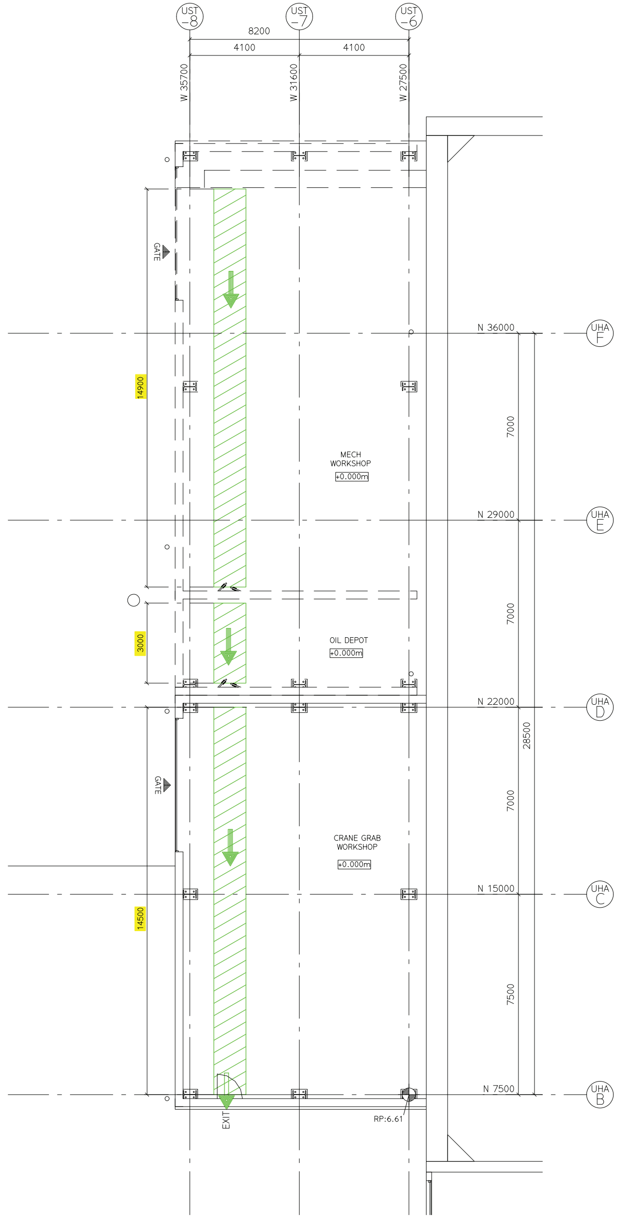
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 . M4 . J05 . 215 (PROJECT NO. . GR. . NO. . SHT.)

REV. 0





LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

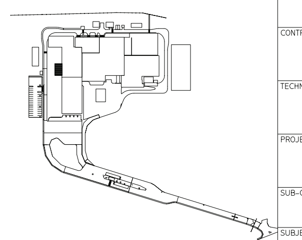
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT:
WORKSHOP BUILDING (UST)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL +0.000m



KEYPLAN

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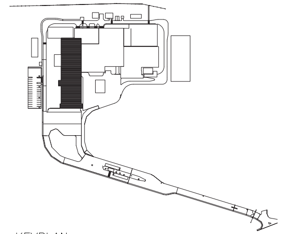
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 (PROJECT NO.) . M4 (GR.) . J05 (NO.) . 661 (SHT.)

REV. 0



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

FUEL UNLOADING AREA(UEA) & FUEL STORAGE AREA(UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +2.000m & +3.200m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J05 251 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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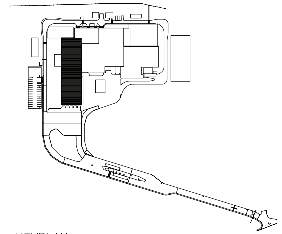

LEGEND:
- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:
NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:
HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:
FUEL UNLOADING AREA(UEA) & FUEL STORAGE AREA(UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +8.000m

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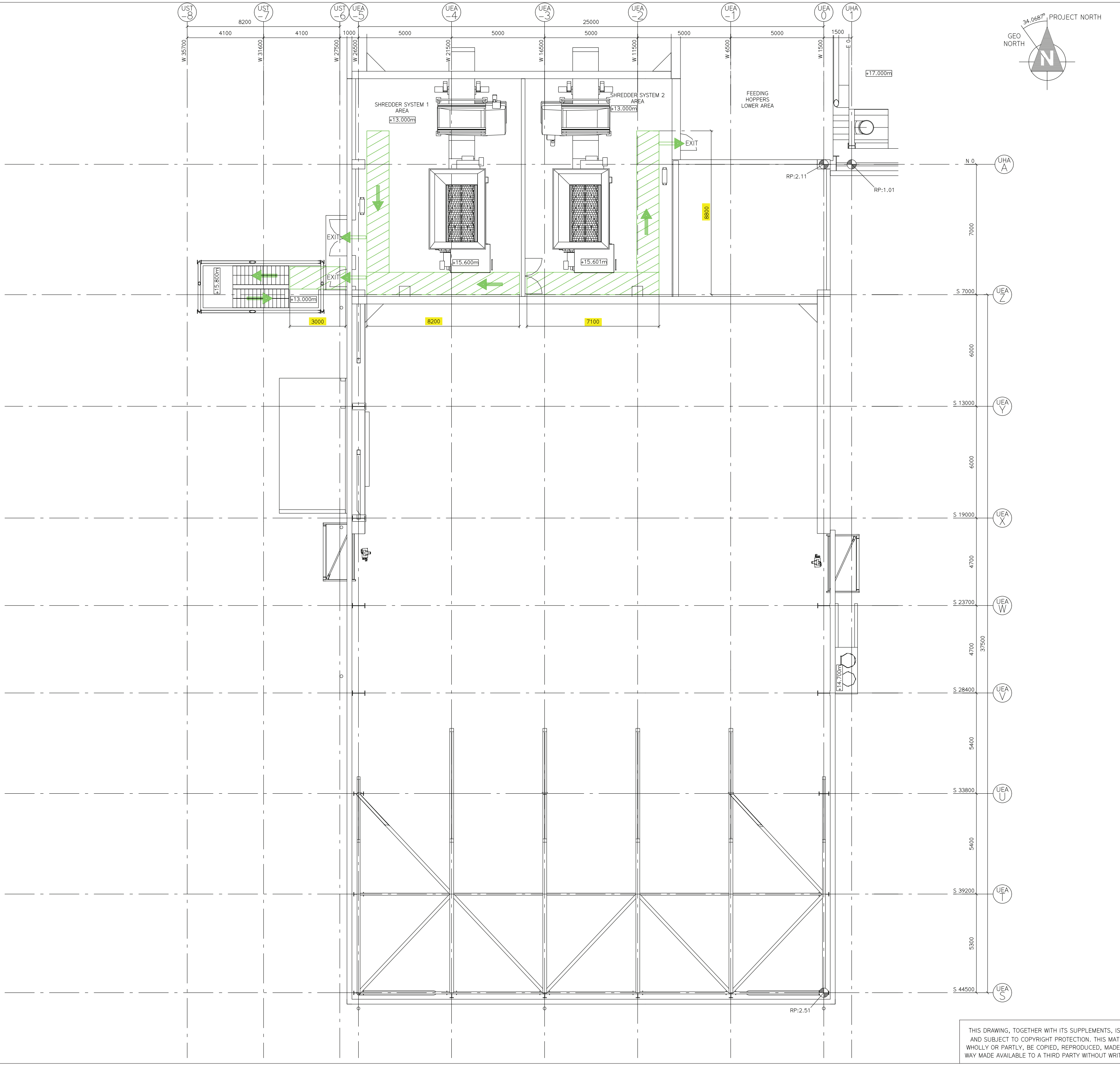
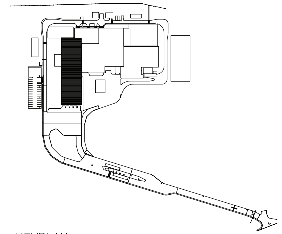
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J05 252

REV. 0




KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

FUEL UNLOADING AREA(UEA) & FUEL STORAGE AREA(UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +13.000m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 ; M4 . J05 . 253 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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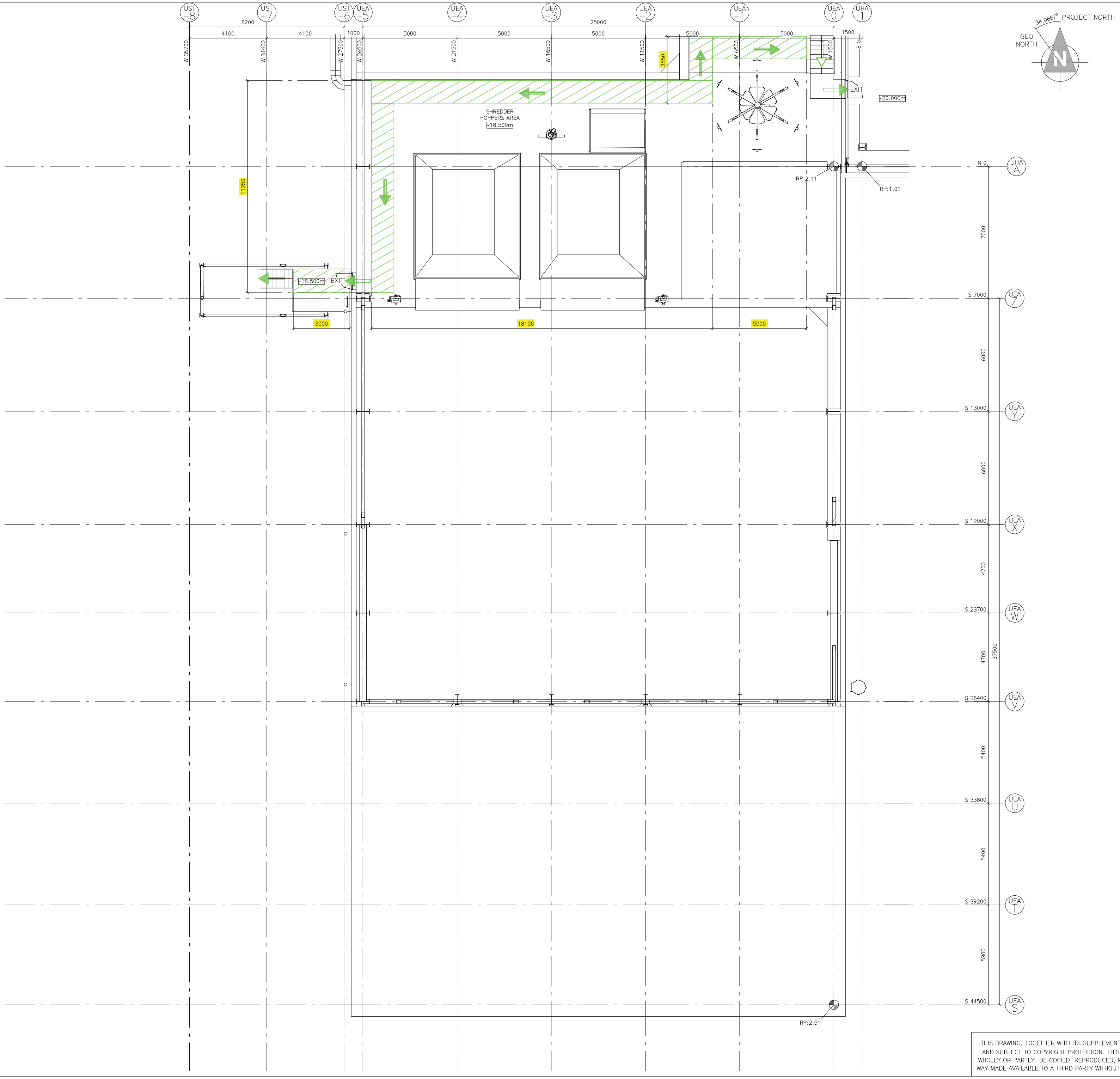

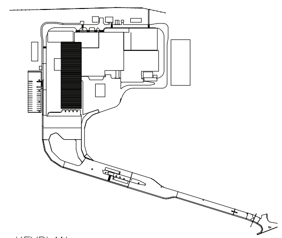

KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

FUEL UNLOADING AREA(UEA) & FUEL STORAGE AREA(UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +18.500m

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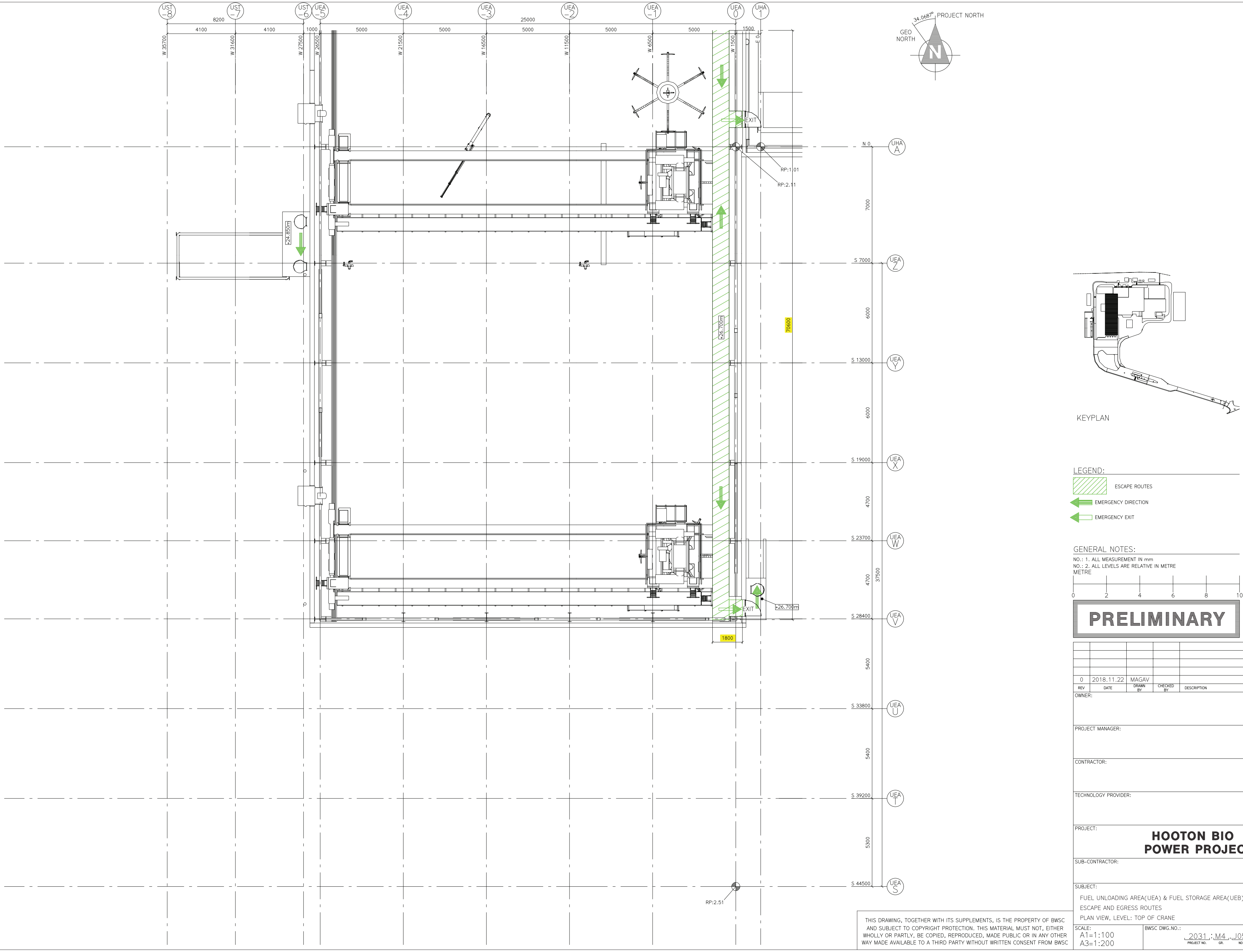
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J05 254 (PROJECT NO. GR. NO. SHT.)

REV. 0



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT:
FUEL UNLOADING AREA(UEA) & FUEL STORAGE AREA(UEB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: TOP OF CRANE

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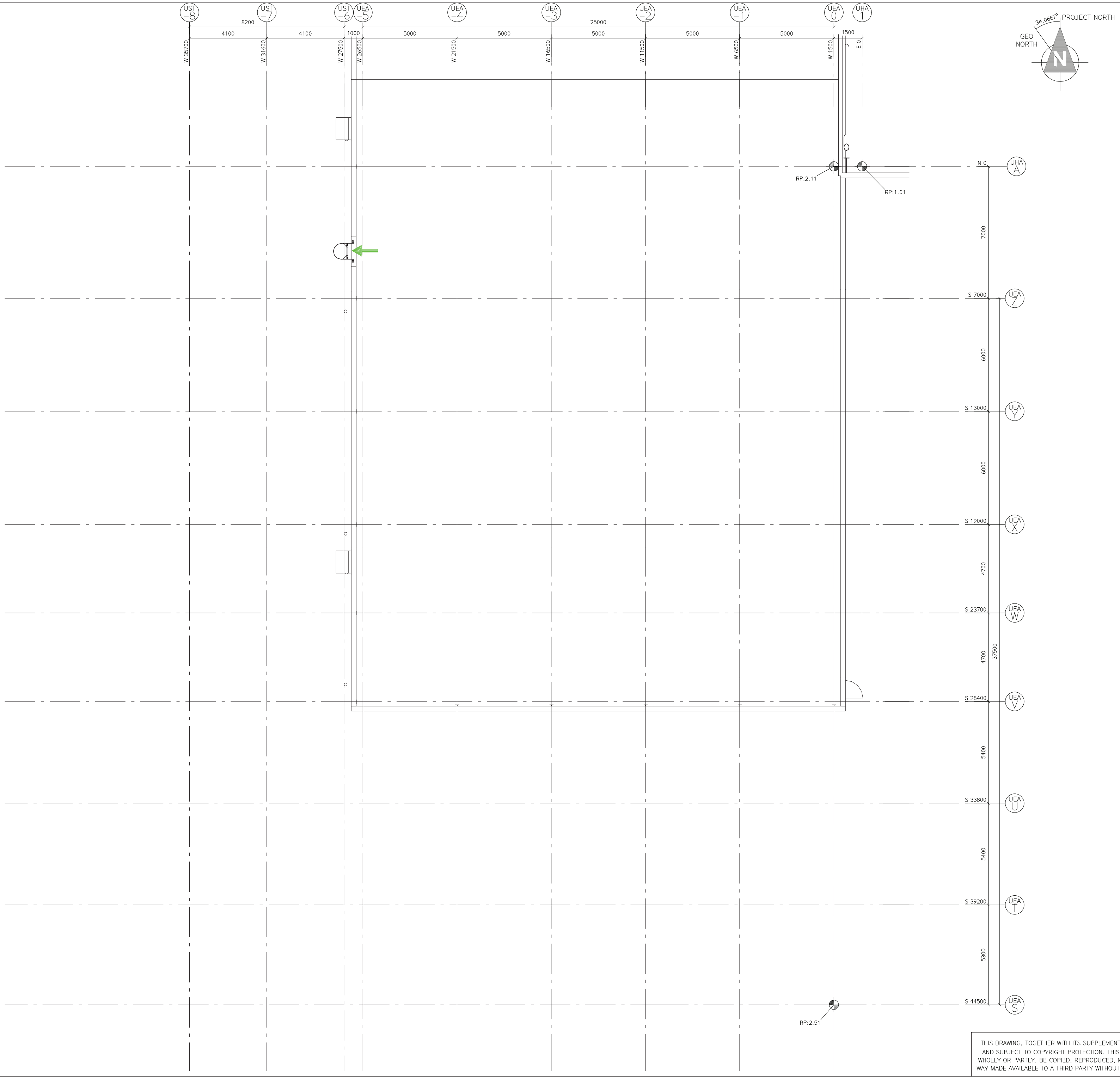
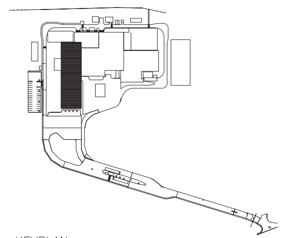
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J05 255 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0





KEYPLAN

LEGEND:

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

FUEL UNLOADING AREA(UEA) & FUEL STORAGE AREA(UEB)
ESCAPE AND EGRESS ROUTES
MAIN ROOF PLAN

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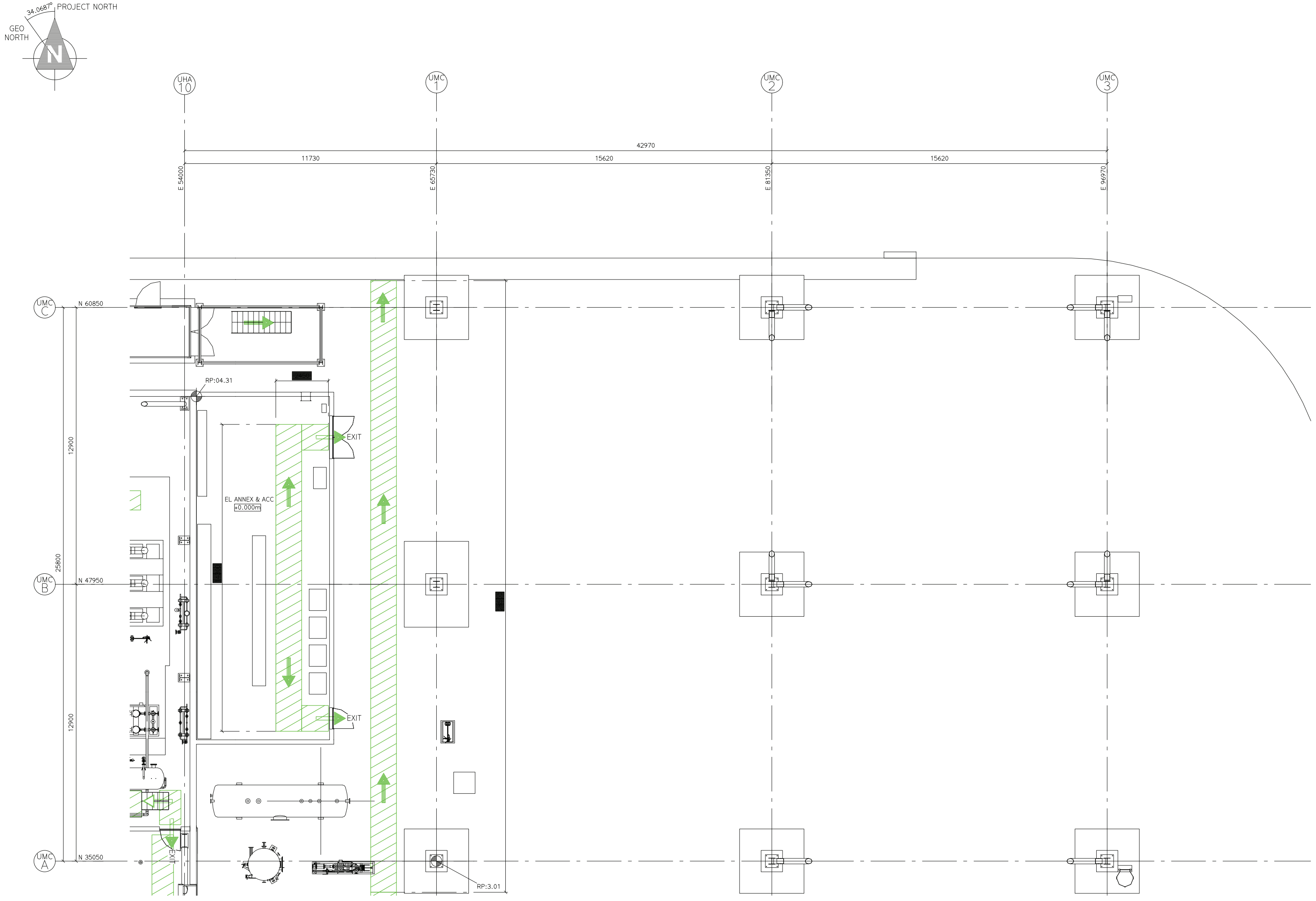
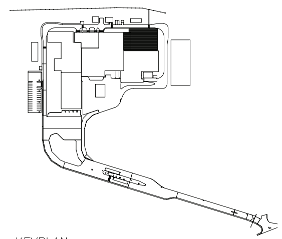
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 M4 J05 256 (PROJECT NO. GR. NO. SHT.)

REV. 0





KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	JOEFA			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

AIR COOLED CONDENSER (UMC) & ACC EXT. EL ANNEX (UBV)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL: +0.000m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 . M5 . J05 . 301 (PROJECT NO. GR. NO. SHT.)

REV. 0

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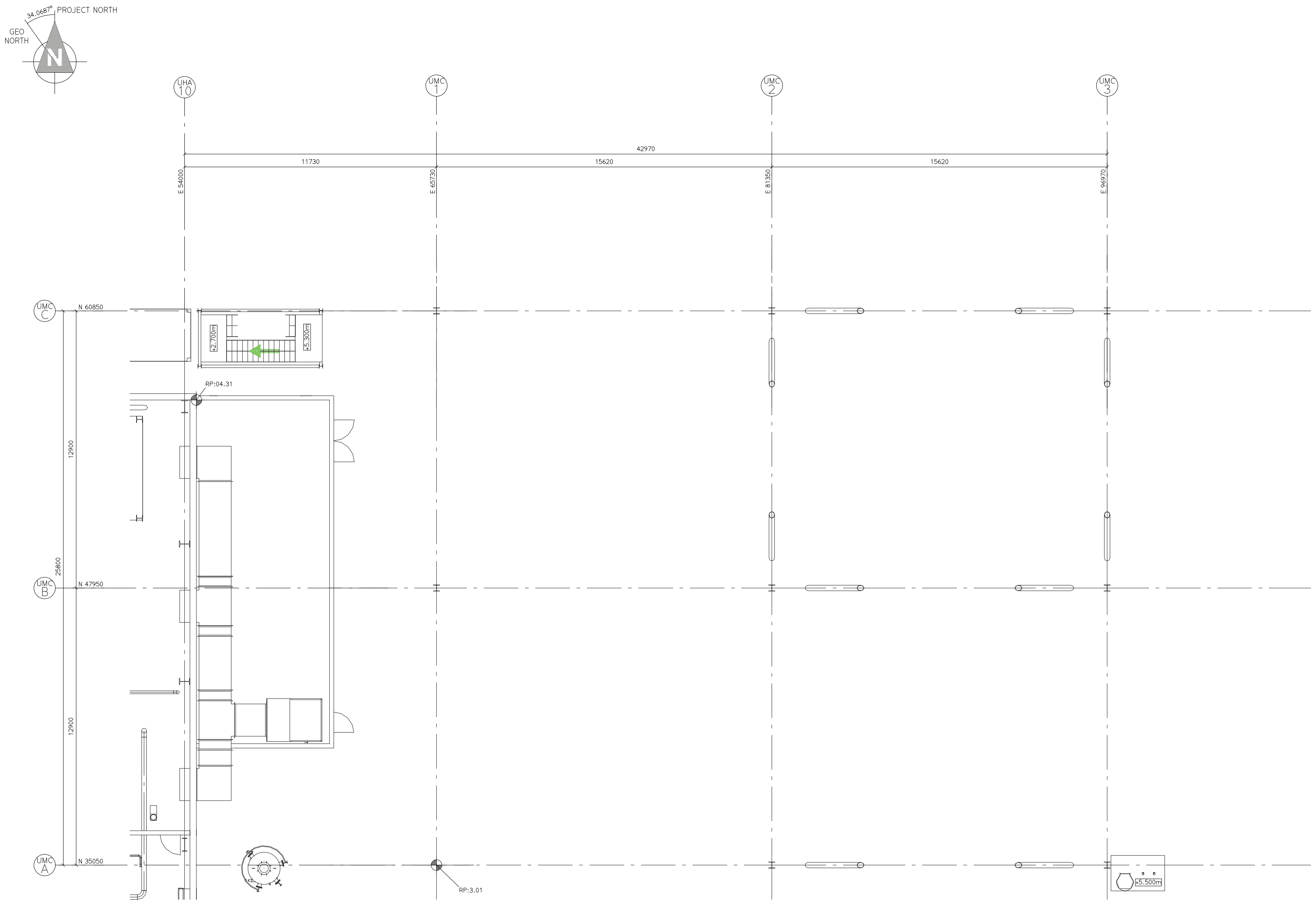

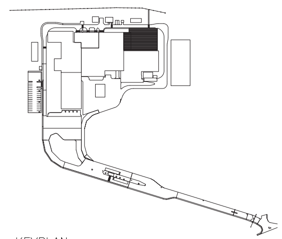

KEYPLAN

LEGEND:

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	JOEFA			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

AIR COOLED CONDENSER (UMC) & ACC EXT. EL ANNEX (UBV)

ESCAPE AND EGRESS ROUTES

PLAN VIEW, LEVEL: +2.600m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M5 J05 302 (PROJECT NO. GR. NO. SHT.)

REV. 0

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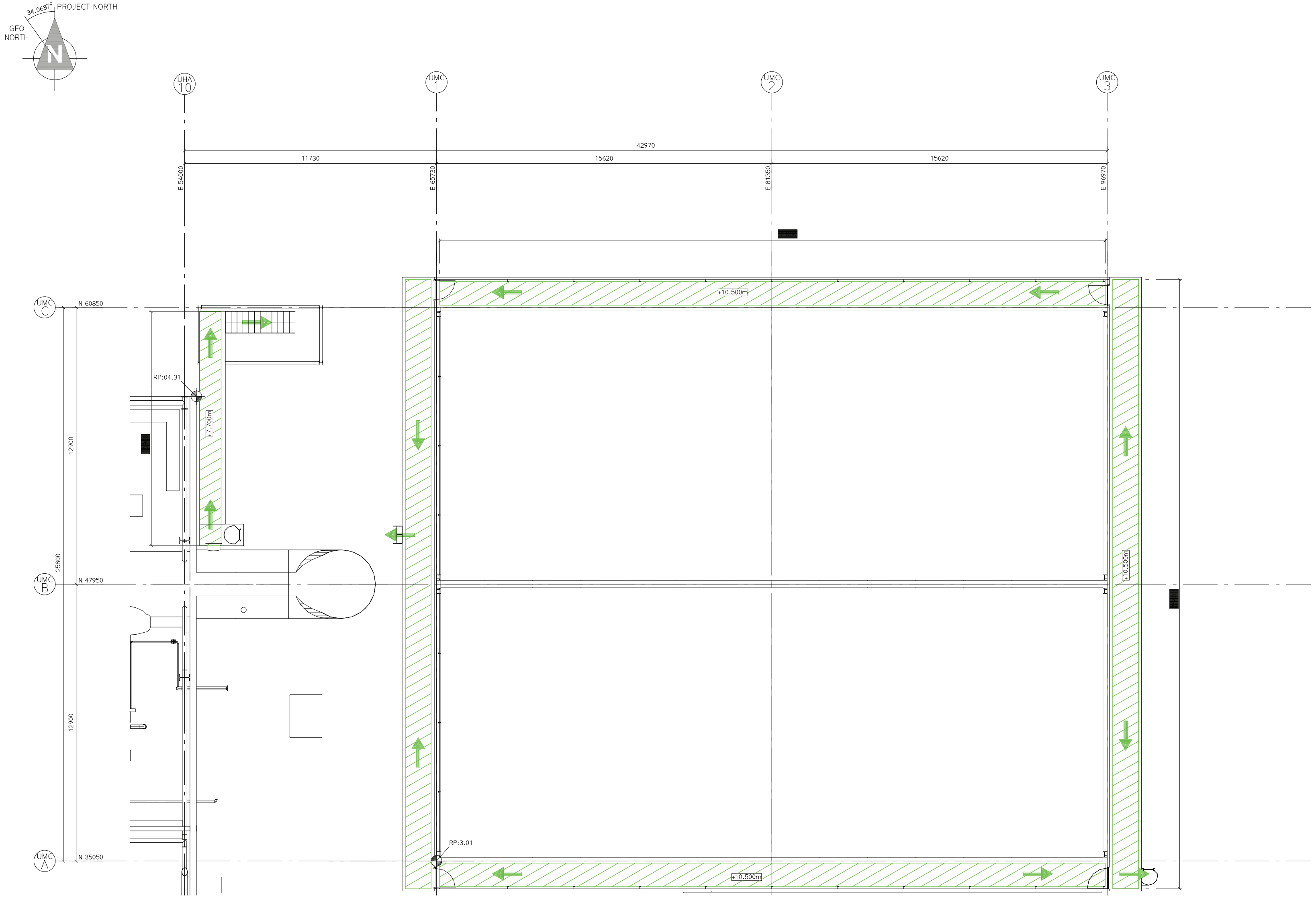

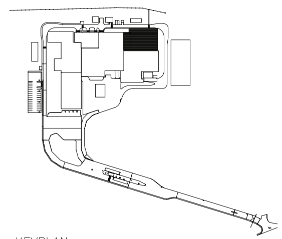

KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	JOEFA			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

AIR COOLED CONDENSER (UMC) & ACC EXT. EL ANNEX (UBV)

ESCAPE AND EGRESS ROUTES

PLAN VIEW, LEVEL: +7.700m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 (PROJECT NO.) M5 (GR.) J05 (NO.) 303 (SHT.) REV. 0

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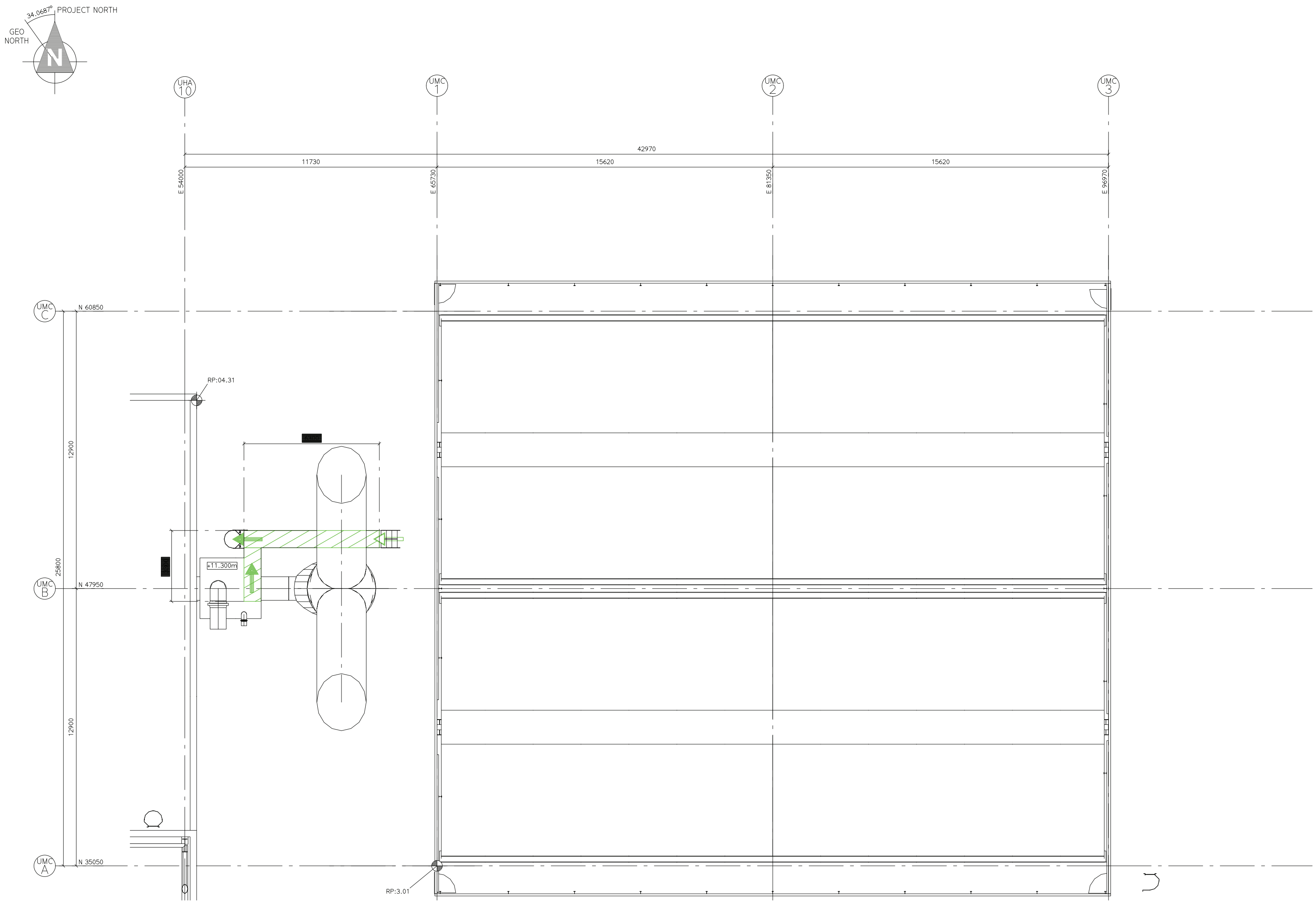

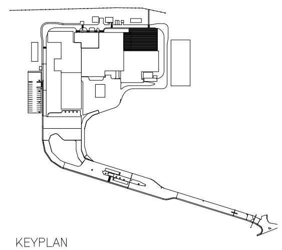

KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	JOEFA			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT:
AIR COOLED CONDENSER (UMC) & ACC EXT. EL ANNEX (UBV)
ESCAPE AND EGRESS ROUTES
TOP VIEW

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M5 J05 304 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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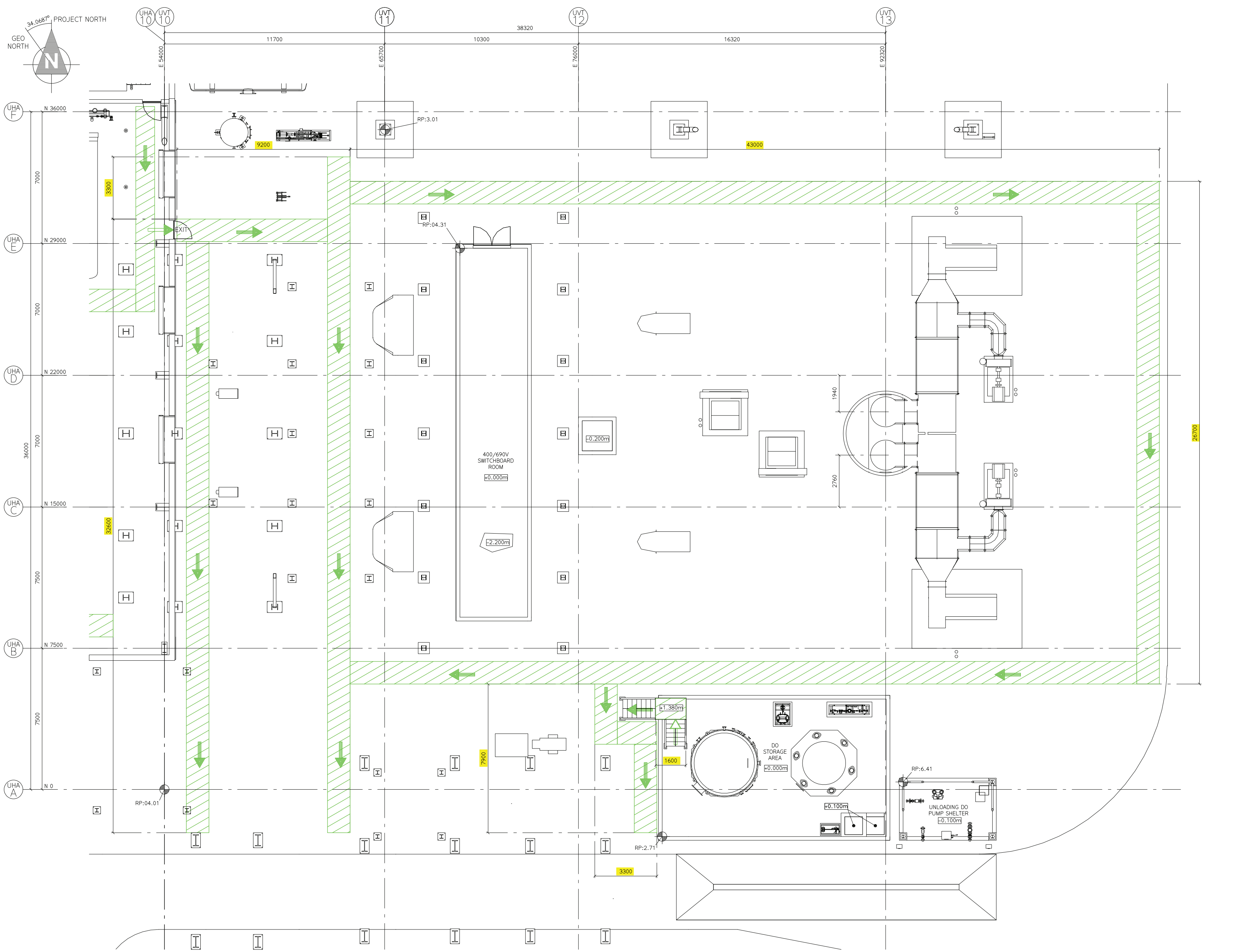

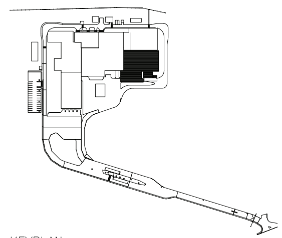

KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE
0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	JOEFA			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

FLUE GAS TREATMENT AREA (UEH, UEK, UVT)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL: +0.000m

SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.:
2031 ; M4 , J05 , 401
PROJECT NO. GR. NO. SHT.

REV. 0

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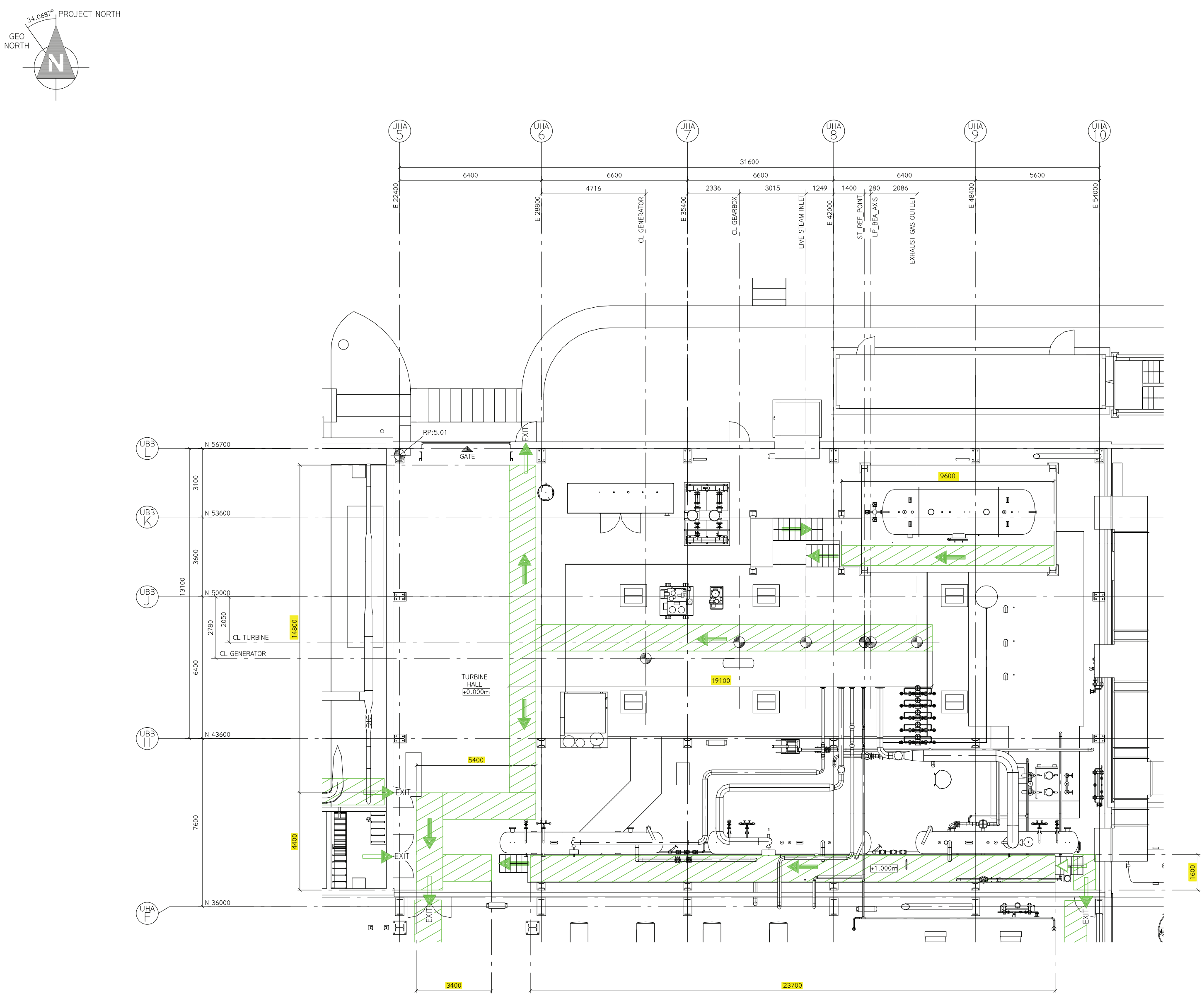

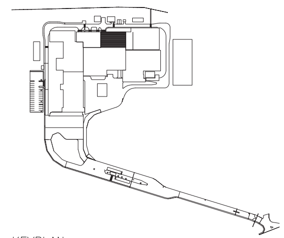

KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT
- EMERGENCY DIRECTION UP

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

STEAM TURBINE BUILDING (UMA)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL: +0.000m

SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 M4 J05 501 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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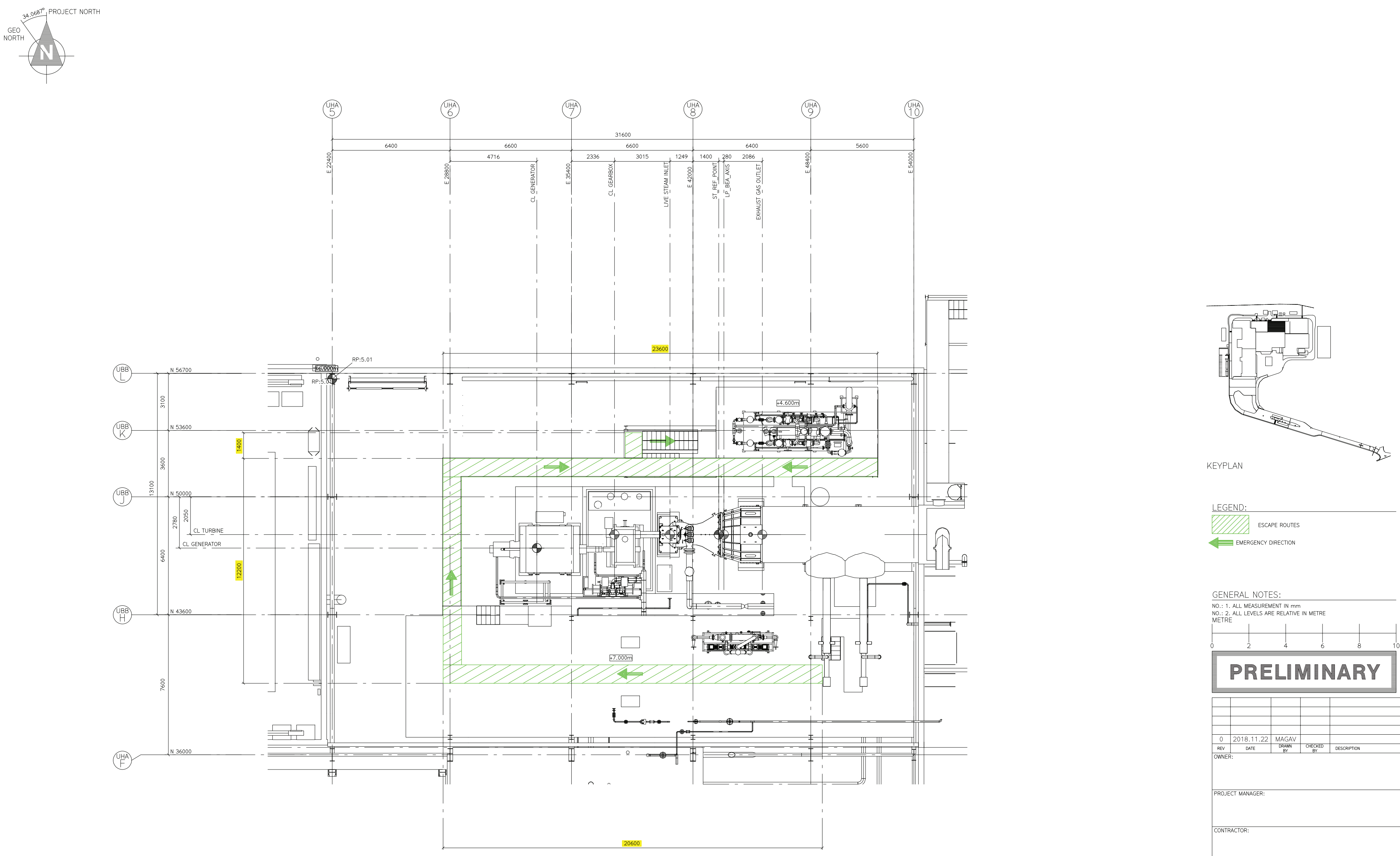

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

STEAM TURBINE BUILDING (UMA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +6.000m

SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 : M4 . J05 . 502 (PROJECT NO. / GR. / NO. / SH.)

REV. 0

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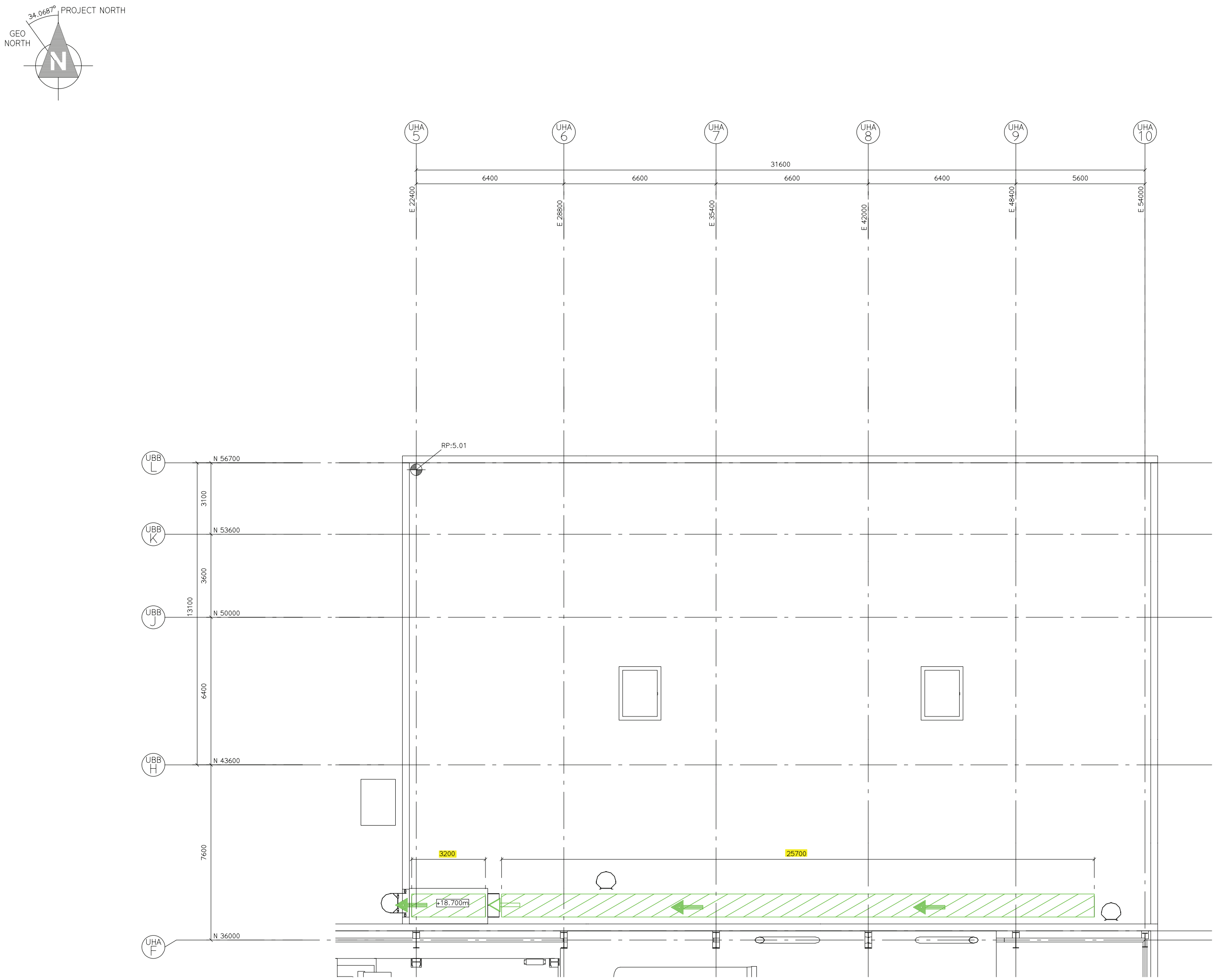

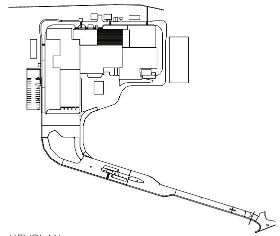

KEYPLAN

LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

EMERGENCY DIRECTION UP

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

STEAM TURBINE BUILDING (UMA)
ESCAPE AND EGRESS ROUTES
MAIN ROOF PLAN

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 : M4 . J05 . 505 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0

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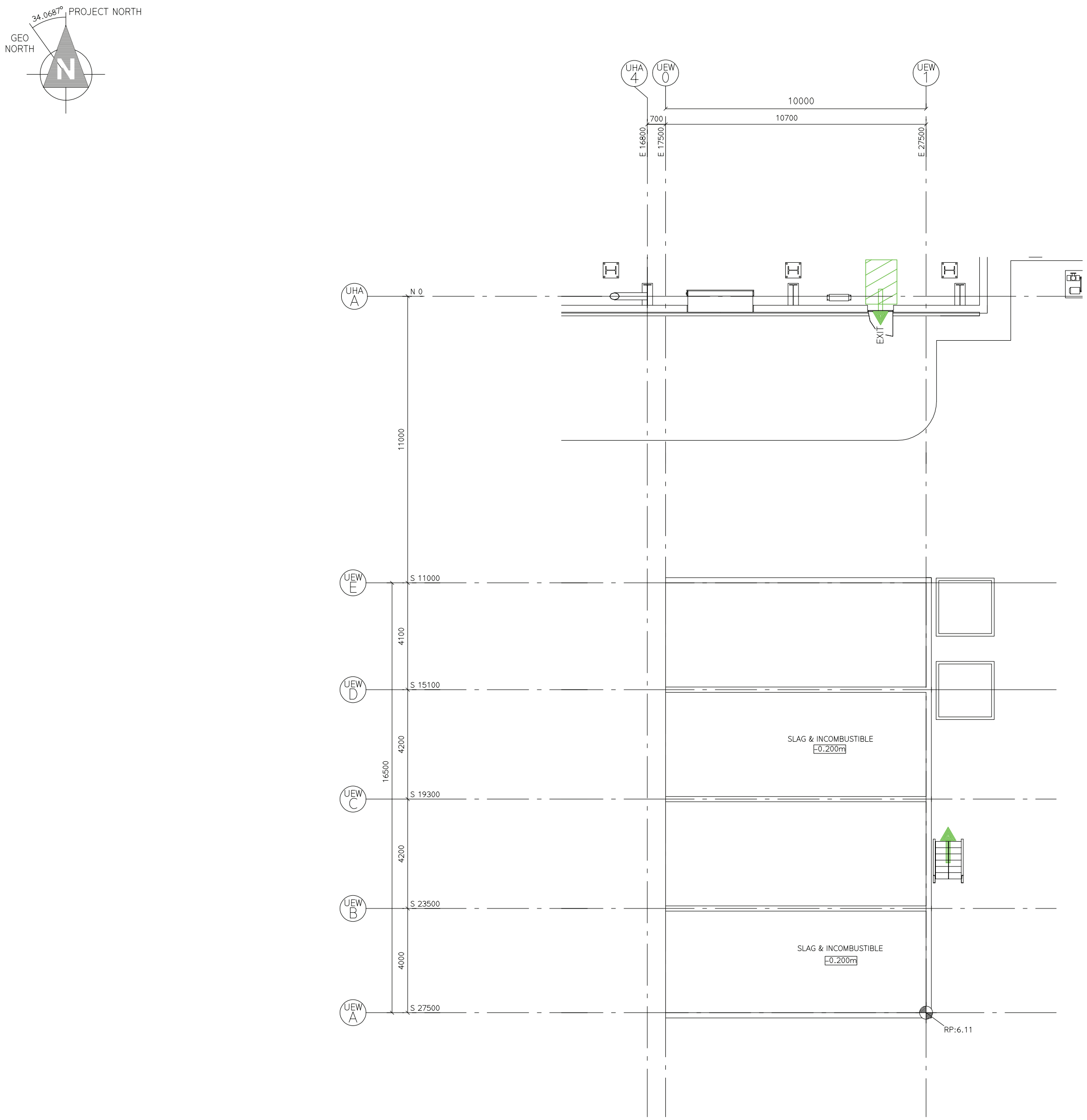


LEGEND:
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:
NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE
0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

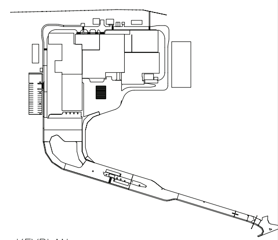
PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:
HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:
SLAG AREA (UEW)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL: -0.200m

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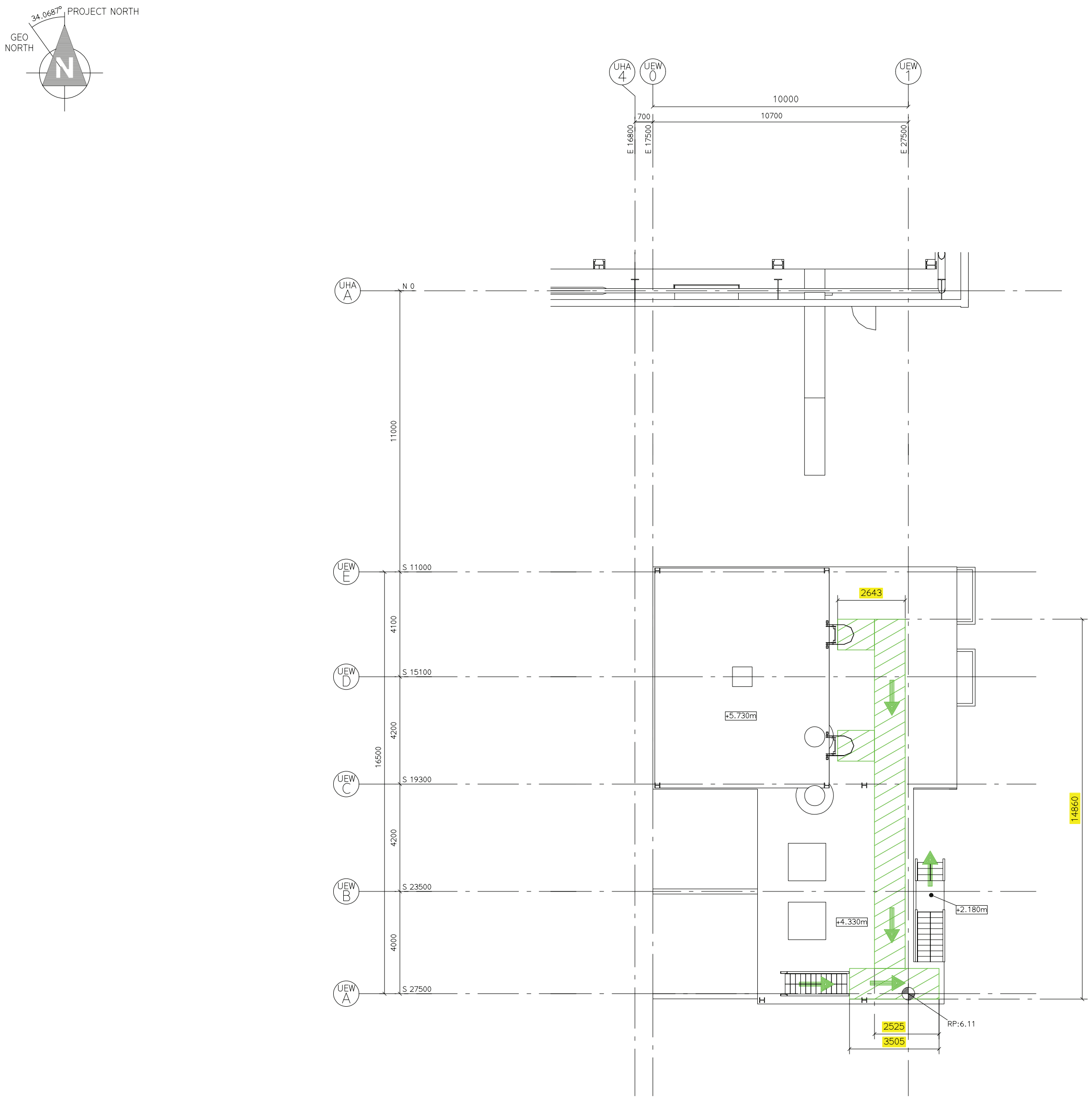
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.:
2031 : M4 . J05 . 611
PROJECT NO. GR. NO. SHT.

REV. 0



LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

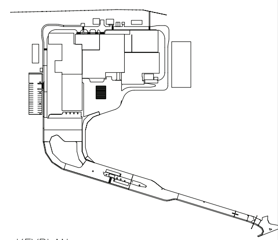
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:

SLAG AREA (UEW)

ESCAPE AND EGRESS ROUTES

PLAN VIEW: LEVEL +4.330m & +5.730m

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SCALE:

A1=1:100

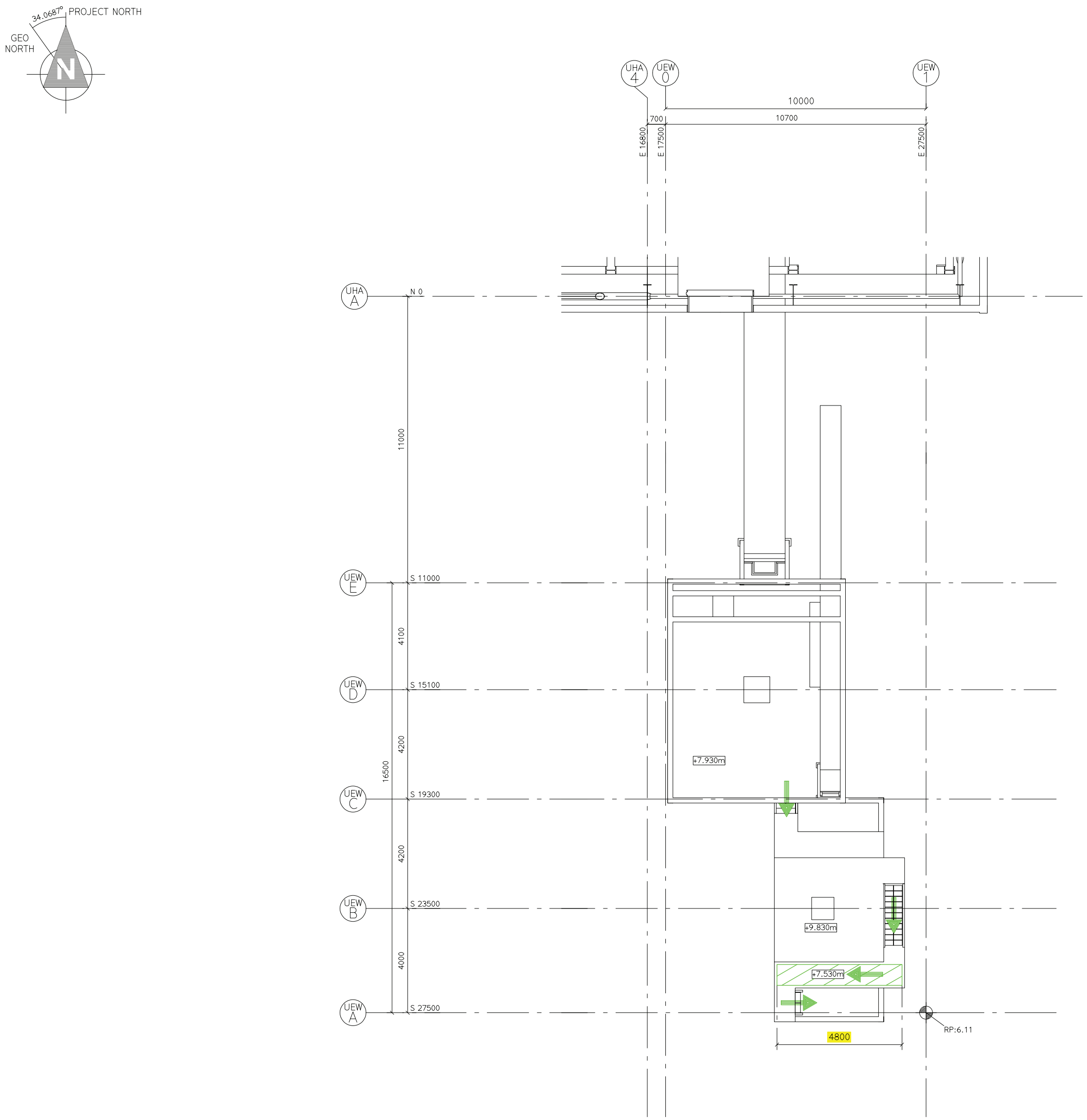
A3=1:200

BWSC DWG.NO.:

2031 : M4 . J05 . 612

PROJECT NO. GR. NO. SHT.

REV. 0



LEGEND:

ESCAPE ROUTES

EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

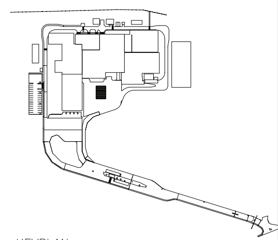
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

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SUBJECT:

SLAG AREA (UEW)

ESCAPE AND EGRESS ROUTES

PLAN VIEW: LEVEL +7.530m, 7.930m & +9.830m

SCALE:

A1=1:100

A3=1:200

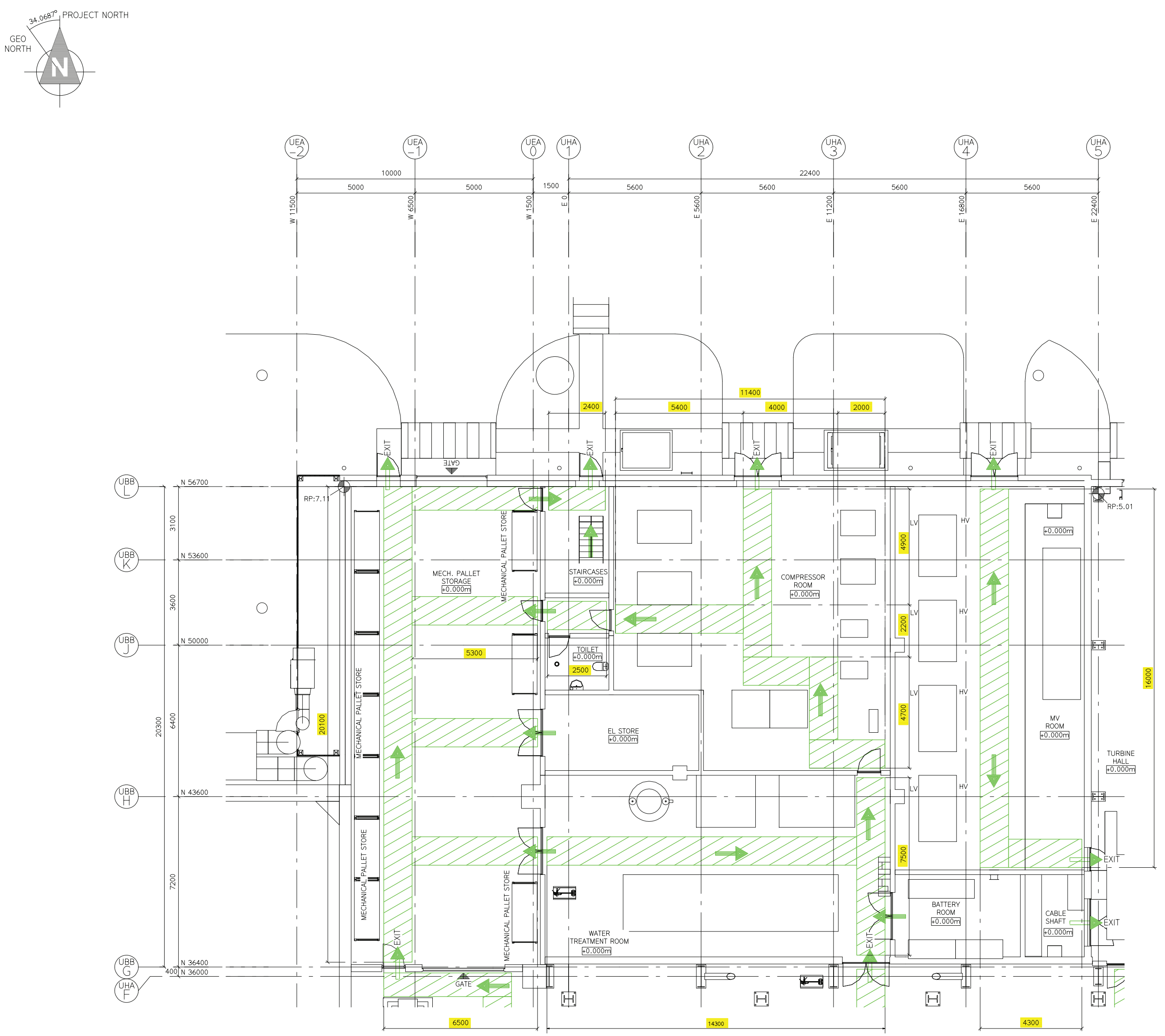
BWSC DWG.NO.:

2031 ; M4 . J05 . 613

PROJECT NO. GR. NO. SHT.

0

REV.



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE
0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

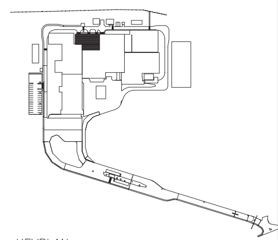
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:
HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:
SERVICE BUILDING / EL ANNEX (UBB)
ESCAPE AND EGRESS ROUTES
GROUND FLOOR PLAN, LEVEL: +0.000m



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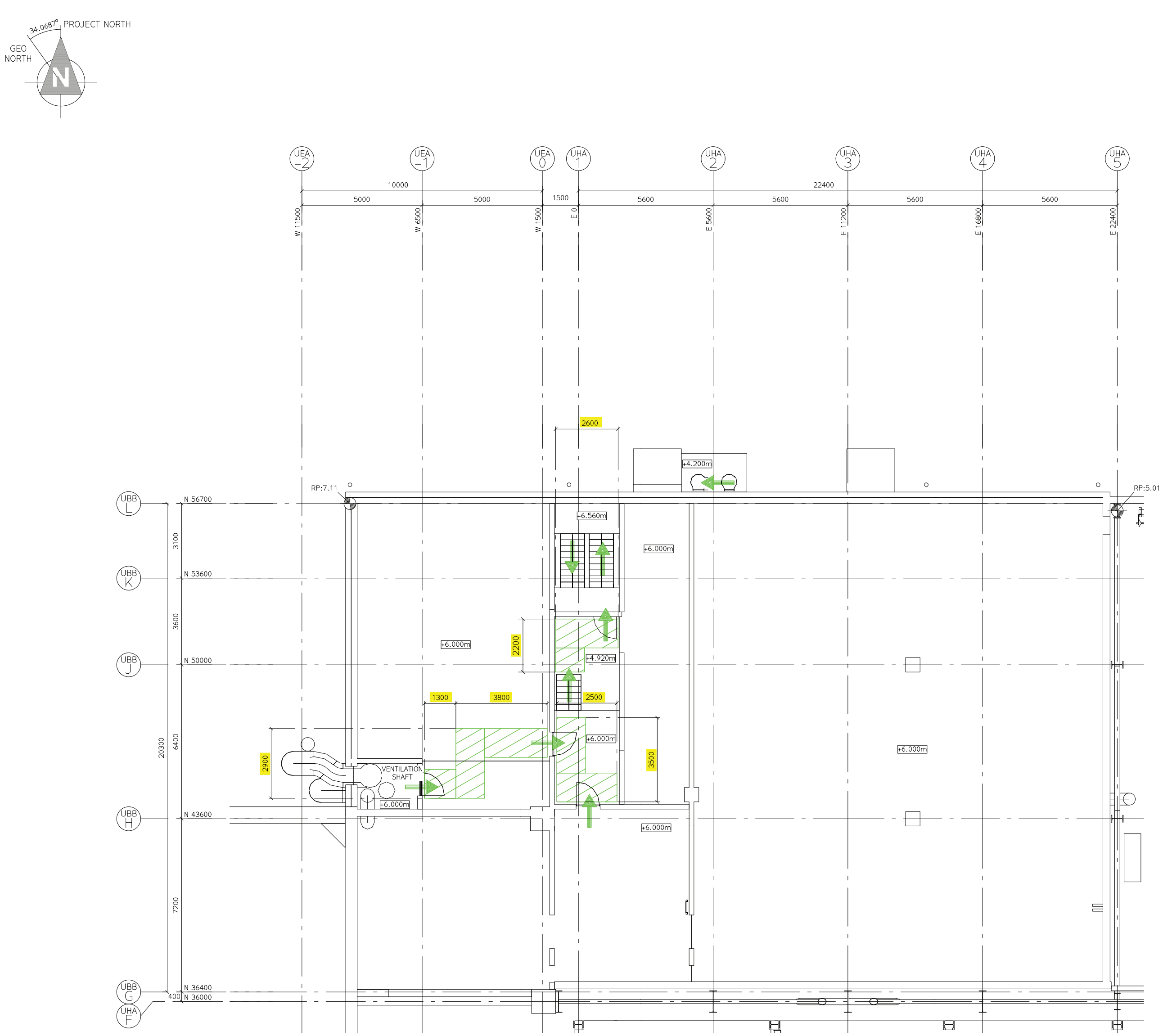
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 M4 J05 711 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE
0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

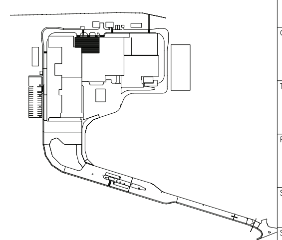
PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:
HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:
SERVICE BUILDING / EL ANNEX (UBB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW, LEVEL: +6.000m

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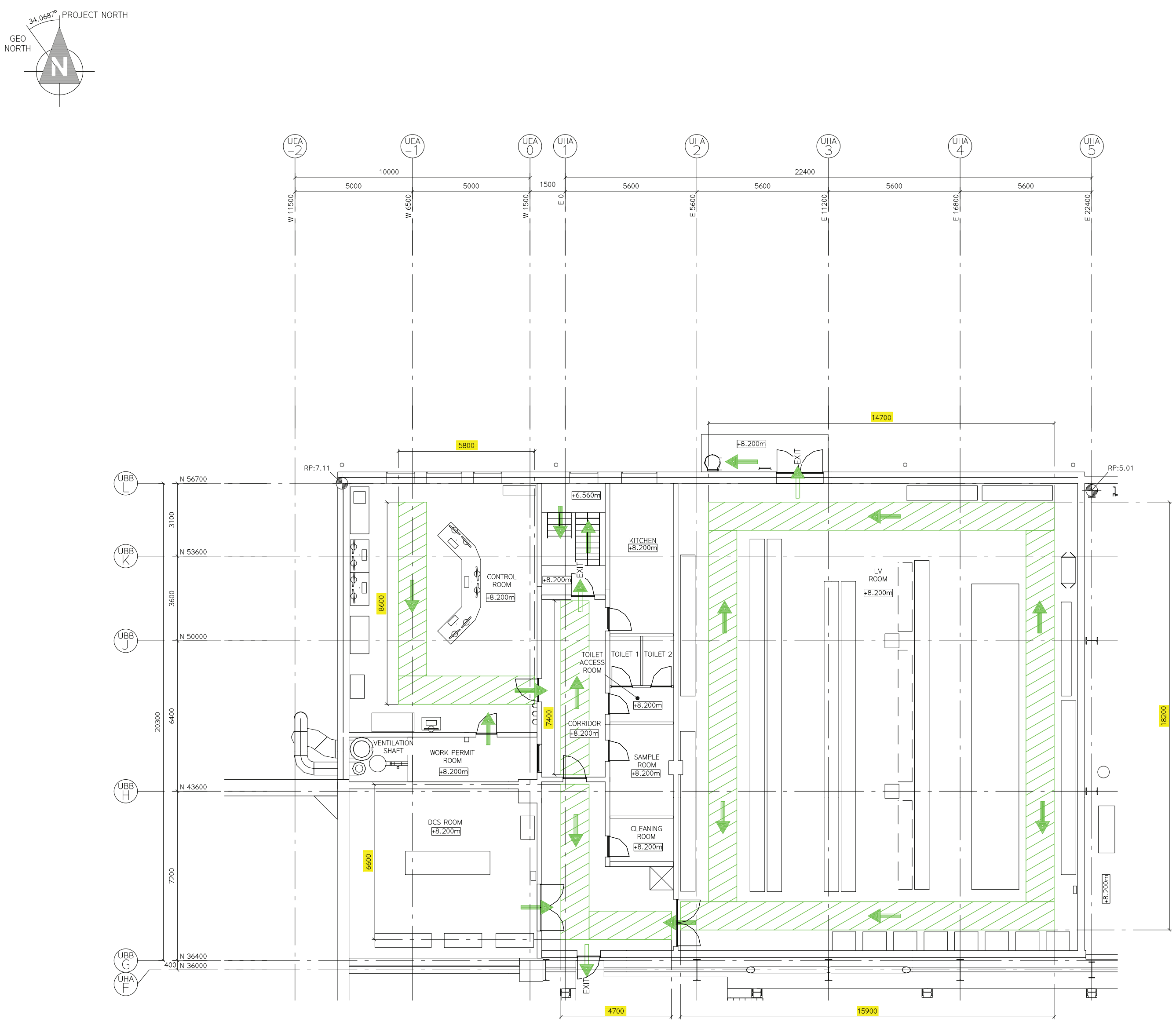
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 M4 J05 712 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

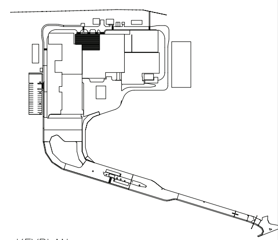
SUB-CONTRACTOR:

SUBJECT:

SERVICE BUILDING / EL ANNEX (UBB)

ESCAPE AND EGRESS ROUTES

PLAN VIEW, LEVEL: +8.200m



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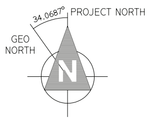
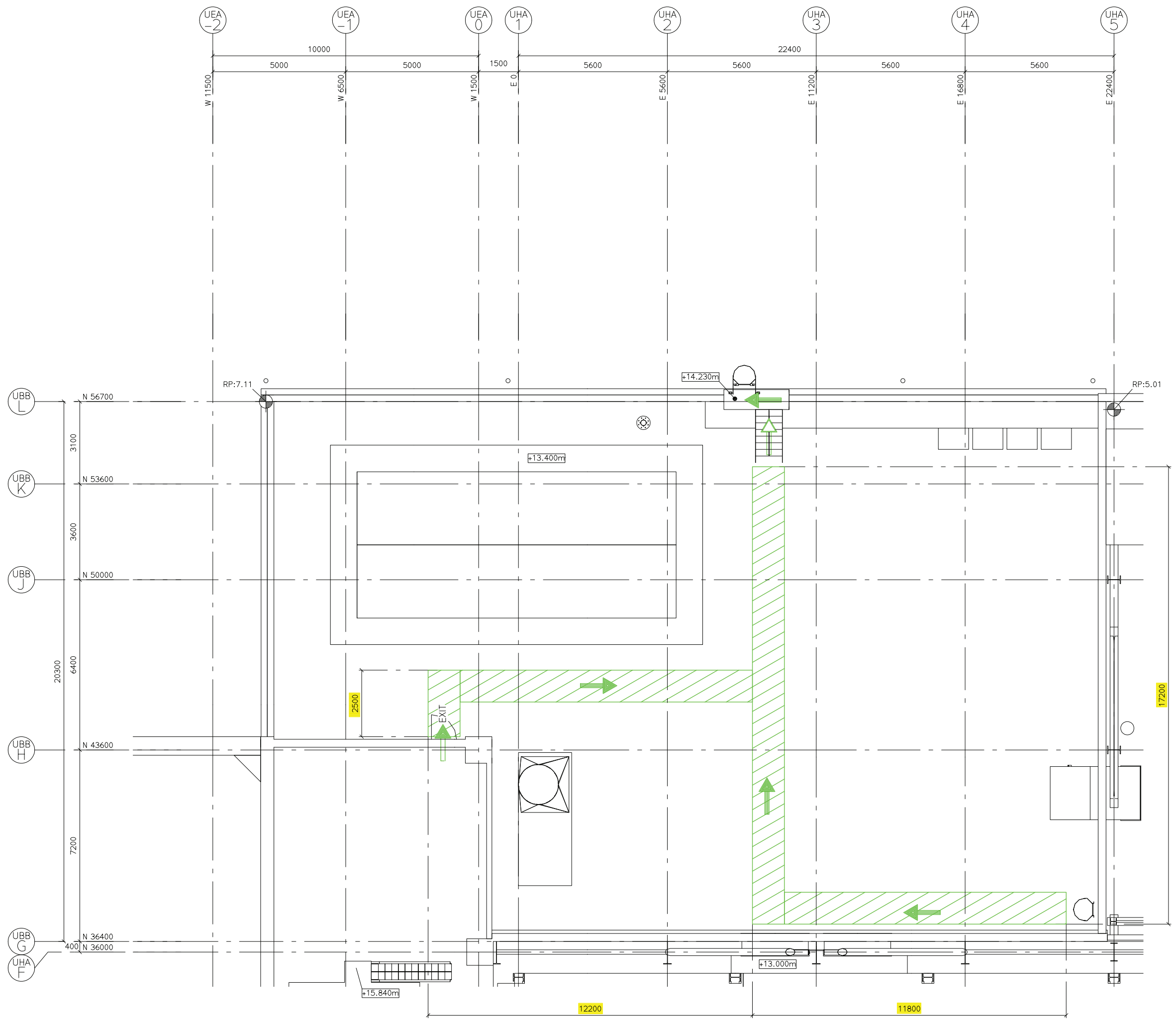
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J05 713 (PROJECT NO. GR. NO. SHT.)

REV. 0





LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY DIRECTION UP
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

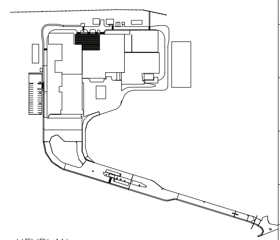
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:
SERVICE BUILDING / EL ANNEX (UBB)
ESCAPE AND EGRESS ROUTES
EL ANNEX MAIN ROOF PLAN

SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 (PROJECT NO.) M4 (GR.) J05 (NO.) 714 (SHT.)

REV. 0

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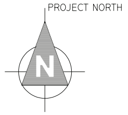
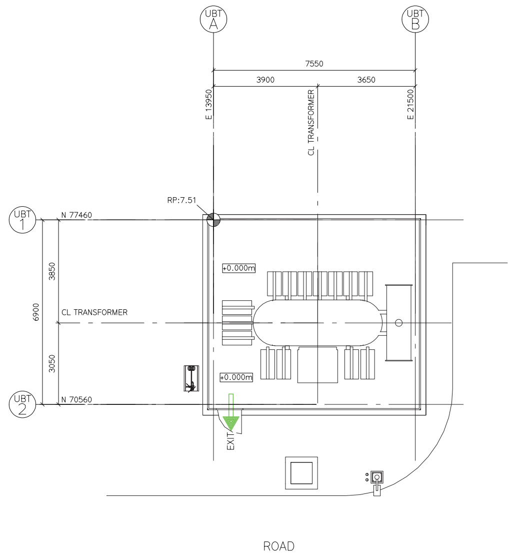




LEGEND:
EMERGENCY EXIT

GENERAL NOTES:
NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

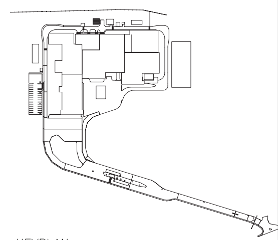
PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:
HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:
STEP-UP TRANSFORMER AREA (UBT)
ESCAPE AND EGRESS ROUTES
PLAN VIEW

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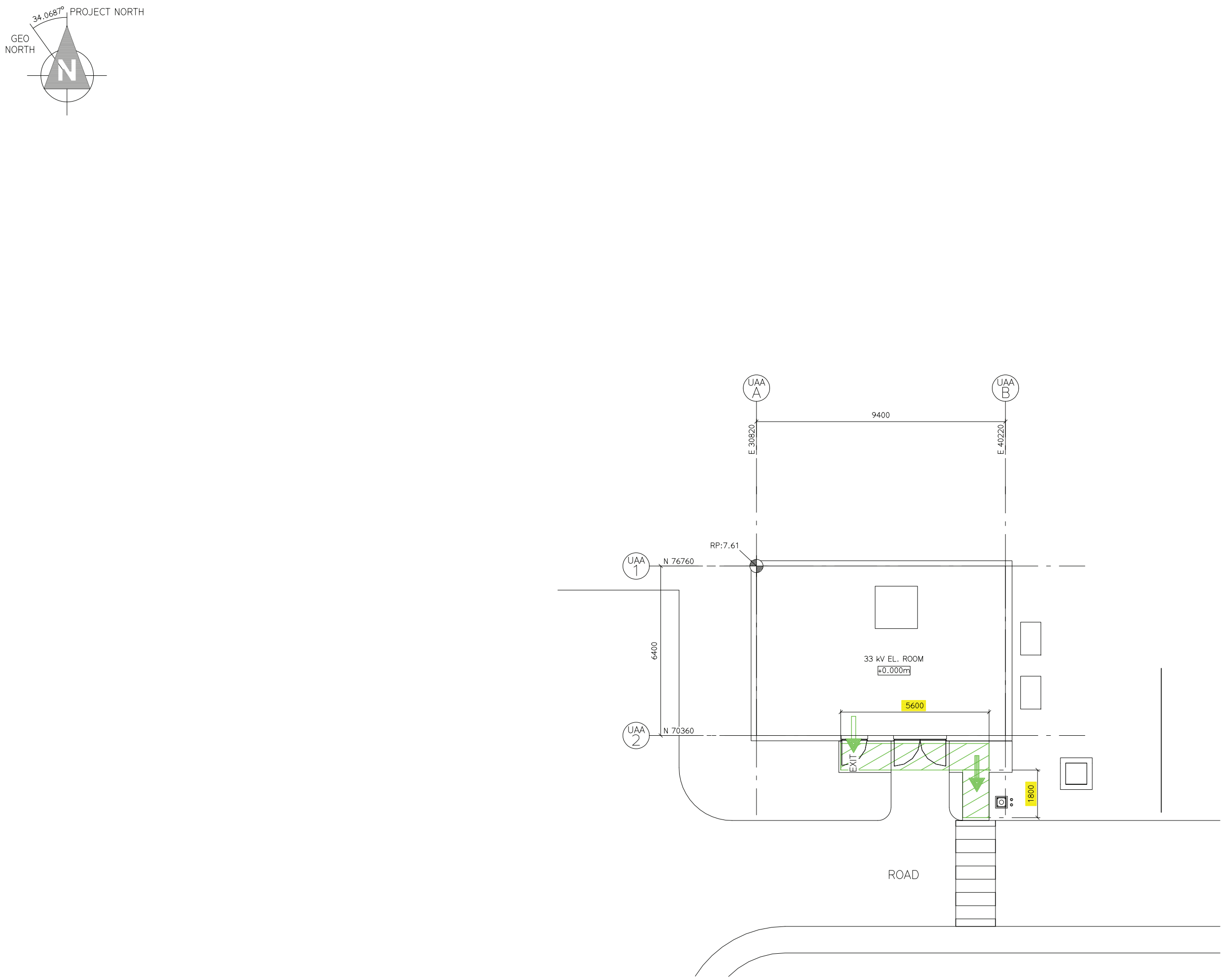
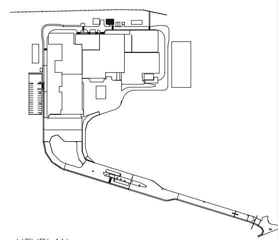
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.: 2031 M4 J05 751 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0




KEYPLAN

LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT:
33kV SUB STATION (UAA)
ESCAPE AND EGRESS ROUTES
PLAN VIEW

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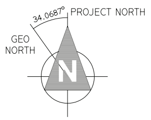
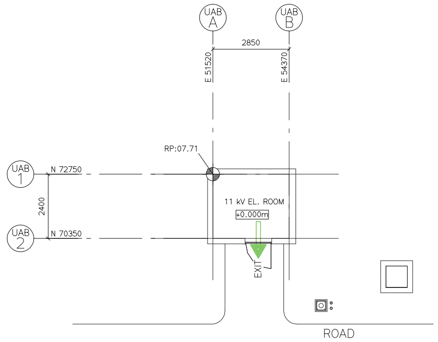
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 (PROJECT NO.) : M4 (GR.) . J05 (NO.) . 761 (SHT.)

REV. 0





LEGEND:

EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

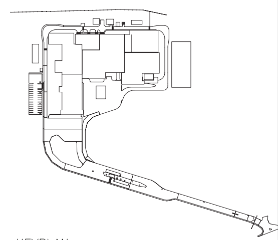
PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:
11kV SUB STATION (UAB)
ESCAPE AND EGRESS ROUTES
PLAN VIEW

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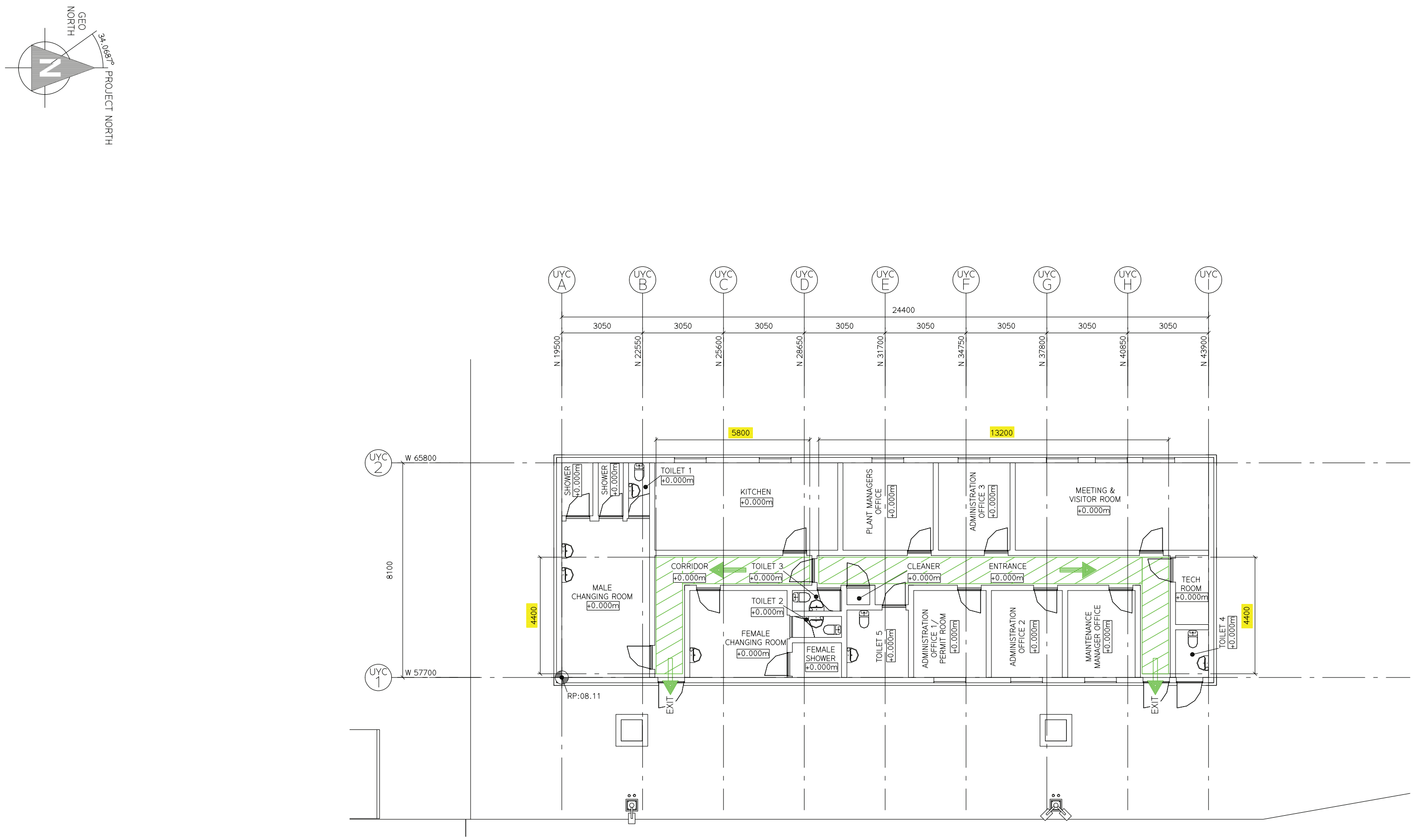
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 : M4 . J05 . 771 (PROJECT NO. / GR. / NO. / SHT.)

REV. 0



LEGEND:

- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

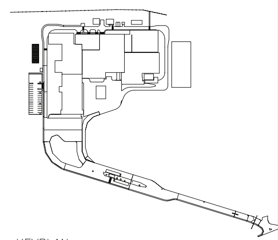
SUB-CONTRACTOR:

SUBJECT:
ADMINISTRATION BUILDING (UYC)
ESCAPE AND EGRESS ROUTES
PLAN VIEW

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 . M4 . J05 . 801 (PROJECT NO. GR. NO. SHT.)

REV. 0



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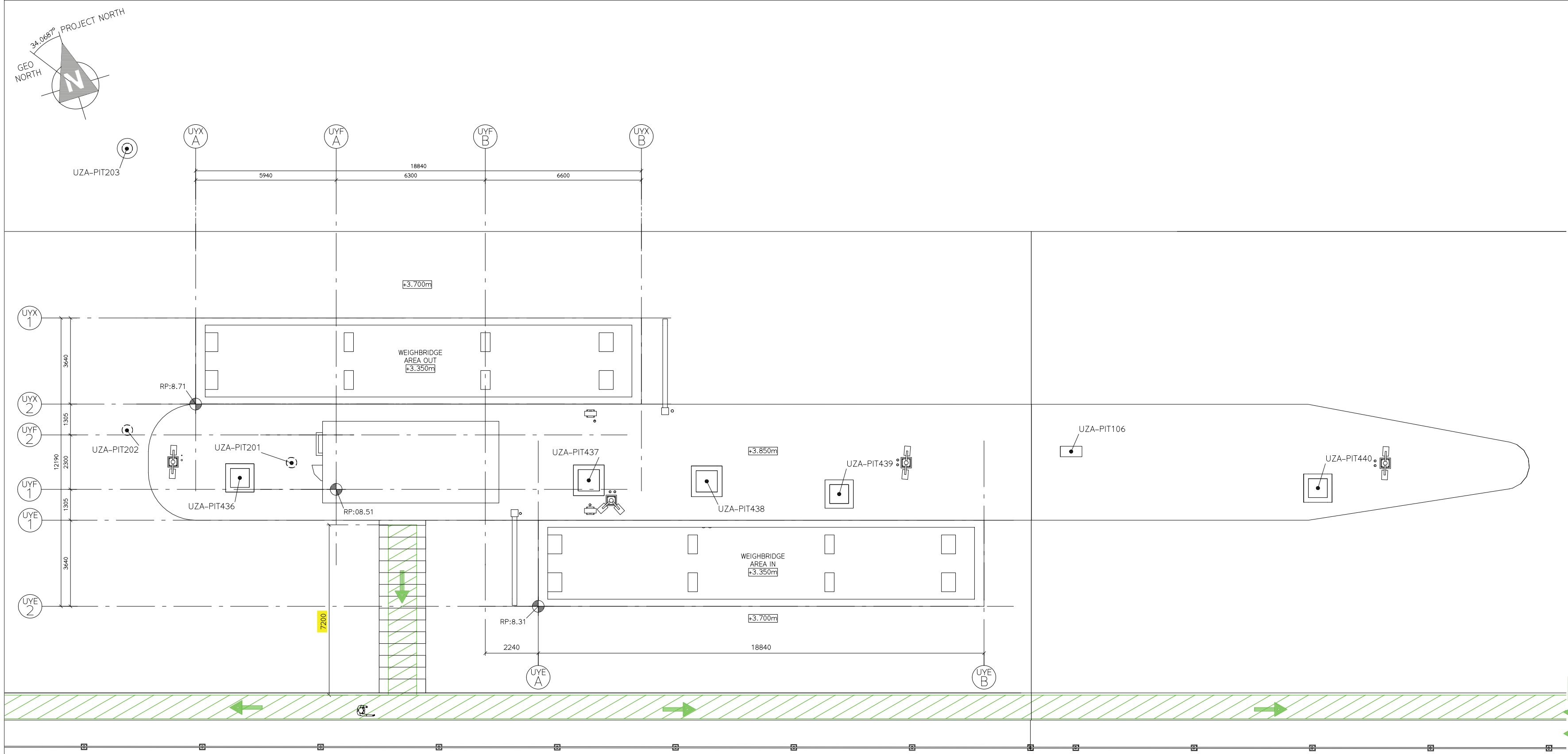
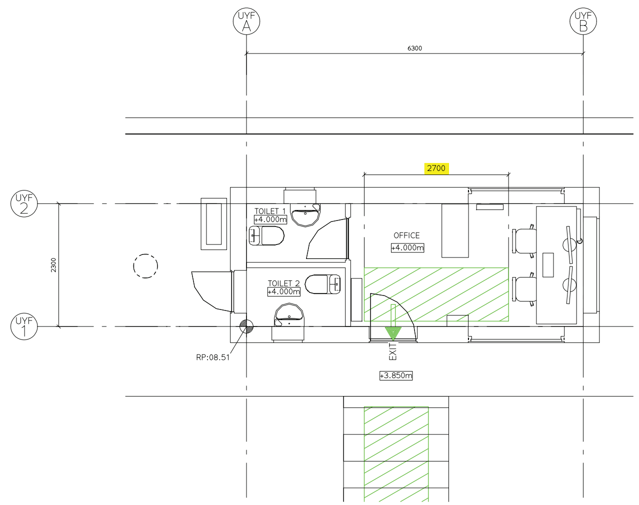


GATE HOUSE & WEIGHBRIDGE AREA OVERVIEW
A1=1:100
A3=1:200



GROUND FLOOR PLAN, LEVEL: +4.000m
A1=1:50
A3=1:100

LEGEND:
- ESCAPE ROUTES
- EMERGENCY DIRECTION
- EMERGENCY EXIT

GENERAL NOTES:
NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.11.22	MAGAV			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

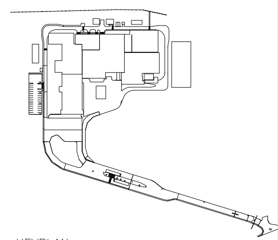
PROJECT:
HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:
SITE ENTRANCE(UZA-1), SECURITY GATE HOUSE(UYF) & WEIGHBRIDGE AREA(UYE/UYX)
ESCAPE AND EGRESS ROUTES
PLAN VIEWS

SCALE:

BWSC DWG.NO.: 2031 M4 J05 850 (PROJECT NO. GR. NO. SHT.)
REV. 0



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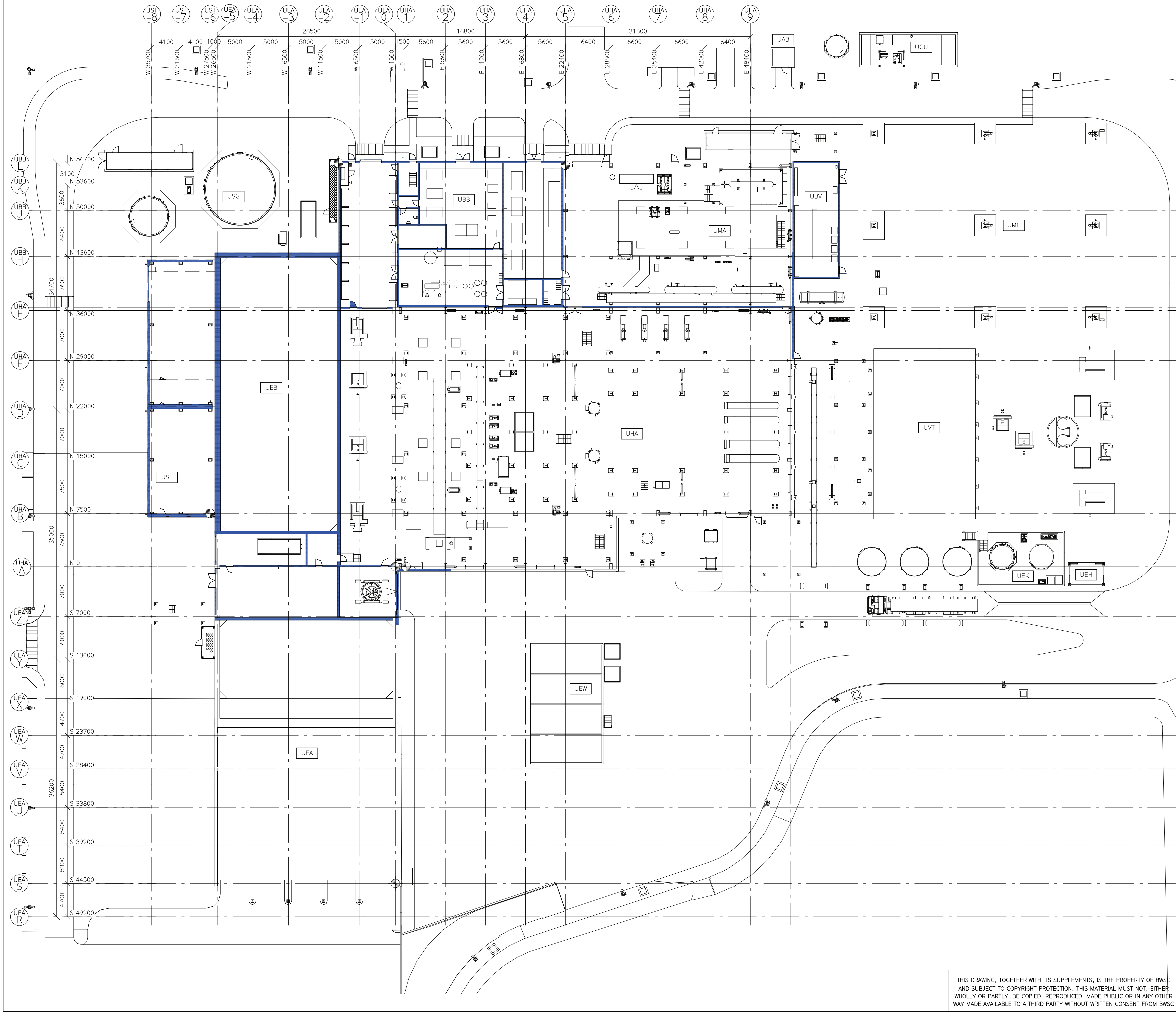

UAB	11kV SUBSTATION
UBB	EL ANNEX & SERVICE BUILDING
UBV	ACC & TURBINE BUILDING EL ROOM
UEA	WASTE FUEL UNLOADING AREA
UEB	WASTE FUEL STORAGE AREA
UEH	DO & AMMONIA UNLOADING AREA
UEK	DO & AMMONIA TANK AREA
UEW	SLAG STORAGE AREA
UGU	EFFLUENT AREA
UHA	BOILER BUILDING
UMA	STEAM TURBINE BUILDING
UMC	AIR COOLED CONDENSER AREA (ACC)
USG	FIRE EQUIPMENT AREA
UST	WORKSHOP BUILDING
UVT	FLUE GAS TREATMENT AREA (FGT)

LEGEND:

120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 5 10 15 20 25

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.04	CAGCX	FEMB		CNH

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

MAIN BUILDING
FIRE SEGREGATION
GROUND FLOOR PLAN, LEVEL +0.000

SCALE:
A1=1:250
A3=1:500

BWSC DWG.NO.: 2031 M4 J12 101 (PROJECT NO. GR. NO. SHT.)

REV. 1

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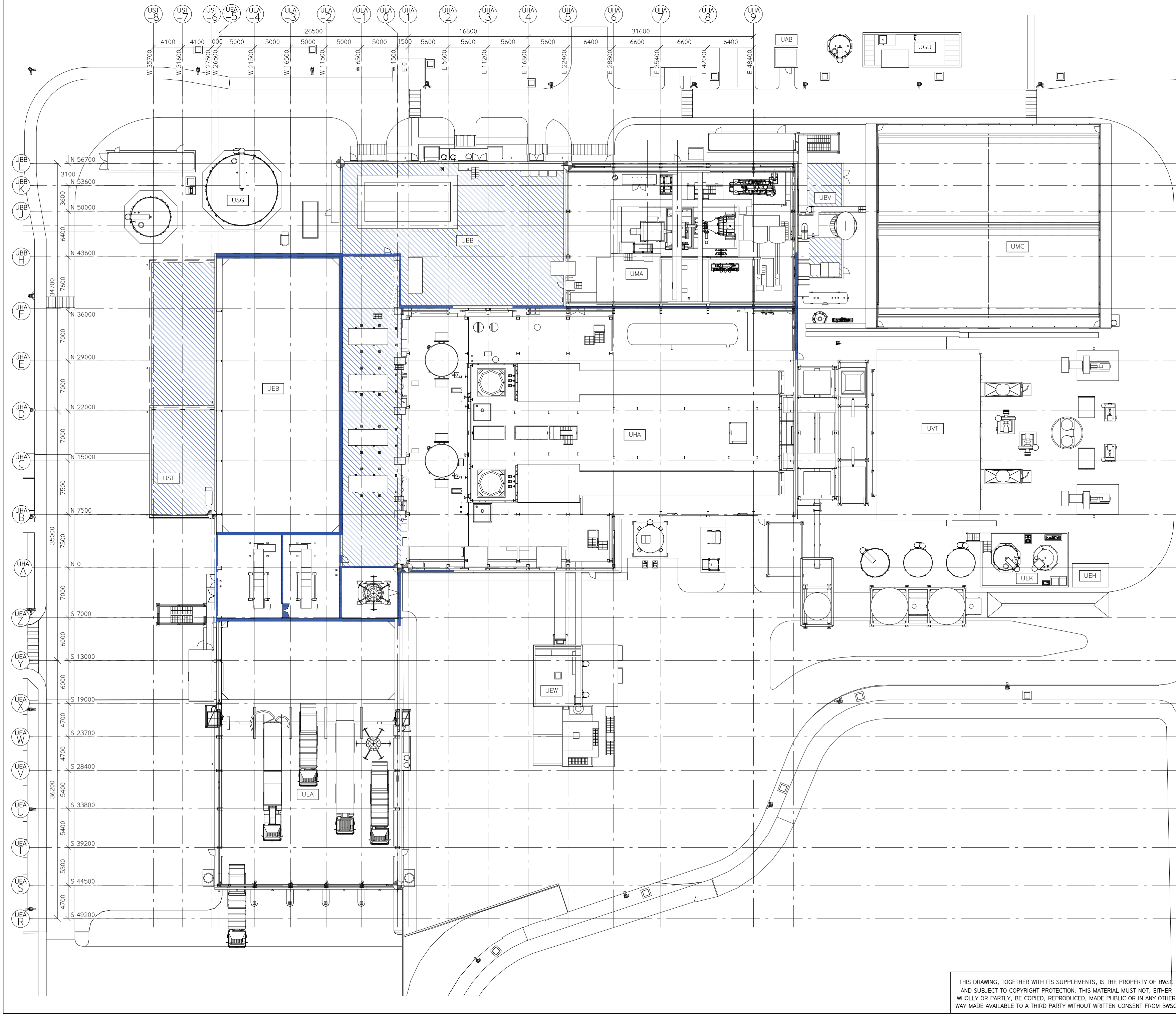

UAB	11kV SUBSTATION
UBB	EL ANNEX & SERVICE BUILDING
UBV	ACC & TURBINE BUILDING EL ROOM
UEA	WASTE FUEL UNLOADING AREA
UEB	WASTE FUEL STORAGE AREA
UEH	DO & AMMONIA UNLOADING AREA
UEK	DO & AMMONIA TANK AREA
UEW	SLAG STORAGE AREA
UGU	EFFLUENT AREA
UHA	BOILER BUILDING
UMA	STEAM TURBINE BUILDING
UMC	AIR COOLED CONDENSER AREA (ACC)
USG	FIRE EQUIPMENT AREA
UST	WORKSHOP BUILDING
UVT	FLUE GAS TREATMENT AREA (FGT)

LEGEND:

- 120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)
- 120 MINUTES FIRE RESISTANT CONCRETE ROOF

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 5 10 15 20 25

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.04	CAGCX	FEMB		CNH

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:
MAIN BUILDING
FIRE SEGREGATION
PLAN, LEVEL +13.000

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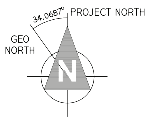
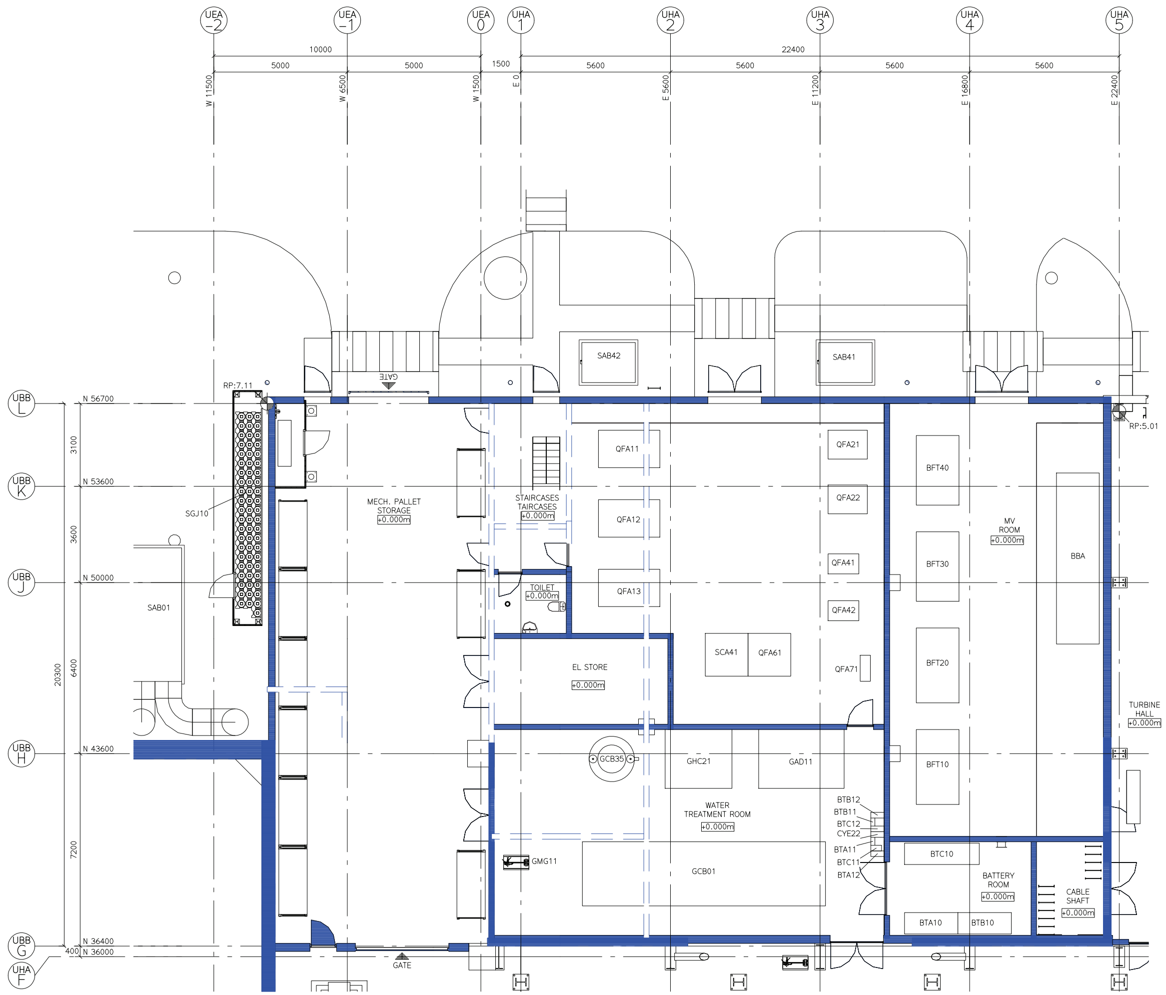
SCALE:
A1=1:250
A3=1:500

BWSC DWG.NO.: 2031 M4 J12 102 (PROJECT NO. GR. NO. SHT.)

REV. 1





MECHANICAL EQUIPMENT		WEIGHT
GAD11	BREAK WATER TANK UNIT	7825 kg
GCB01	WATER TREATMENT PLANT UNIT	12000 kg
GCB35	BRINE MAKER TANK	3600 kg
GHC21	DEMIN WATER PUMP UNIT	7825 kg
GMG11	WATER TREATMENT PIT PUMP UNIT	100 kg
QFA11	AIR COMPRESSOR 1 UNIT	2050 kg
QFA12	AIR COMPRESSOR 2 UNIT	2050 kg
QFA13	AIR COMPRESSOR 3 UNIT	2050 kg
QFA21	REFRIGERANT AIR DRYER 1	410 kg
QFA22	REFRIGERANT AIR DRYER 2	410 kg
QFA41	ADSORPTION AIR DRYER UNIT 1	815 kg
QFA42	ADSORPTION AIR DRYER UNIT 2	815 kg
QFA61	INSTRUMENT AIR RECEIVER UNIT	0 kg
QFA71	OW SEPARATOR	unset kg
SAB01	EL ANNEX MAIN AHU	unset kg
SAB41	EL ANNEX MAIN AHU	unset kg
SAB42	EL ANNEX MAIN AHU	unset kg
SCA41	SERVICE AIR RECEIVER UNIT	unset kg
SGJ10	INERT GAS UNIT NO.1	0 kg

ELECTRICAL EQUIPMENT		WEIGHT
BBA	11 kV SWITCHGEAR	5500 kg
BFT10	400 V STATION AUX. TRANSFORMER 1	8400 kg
BFT20	400 V STATION AUX. TRANSFORMER 2	8400 kg
BFT30	690 V STATION AUX. TRANSFORMER 1	6300 kg
BFT40	690 V STATION AUX. TRANSFORMER 2	6300 kg
BTA10	DC BATTERY 1	1500 kg
BTA11	DC CONNECTION BOX 1	15 kg
BTA12	DC FUSE BOX 1	50 kg
BTB10	DC BATTERY 2	1500 kg
BTB11	DC CONNECTION BOX 2	15 kg
BTB12	DC FUSE BOX 2	50 kg
BTC10	UPS BATTERY	1500 kg
BTC11	UPS CONNECTION BOX	15 kg
BTC12	UPS FUSEBOX	25 kg
CYE22	INERT GAS PANEL	275 kg

LEGEND:

120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE
0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.08	MAGAV			

OWNER:

PROJECT MANAGER:

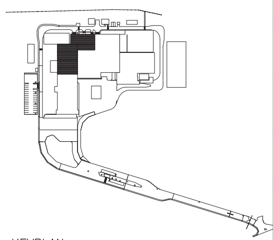
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

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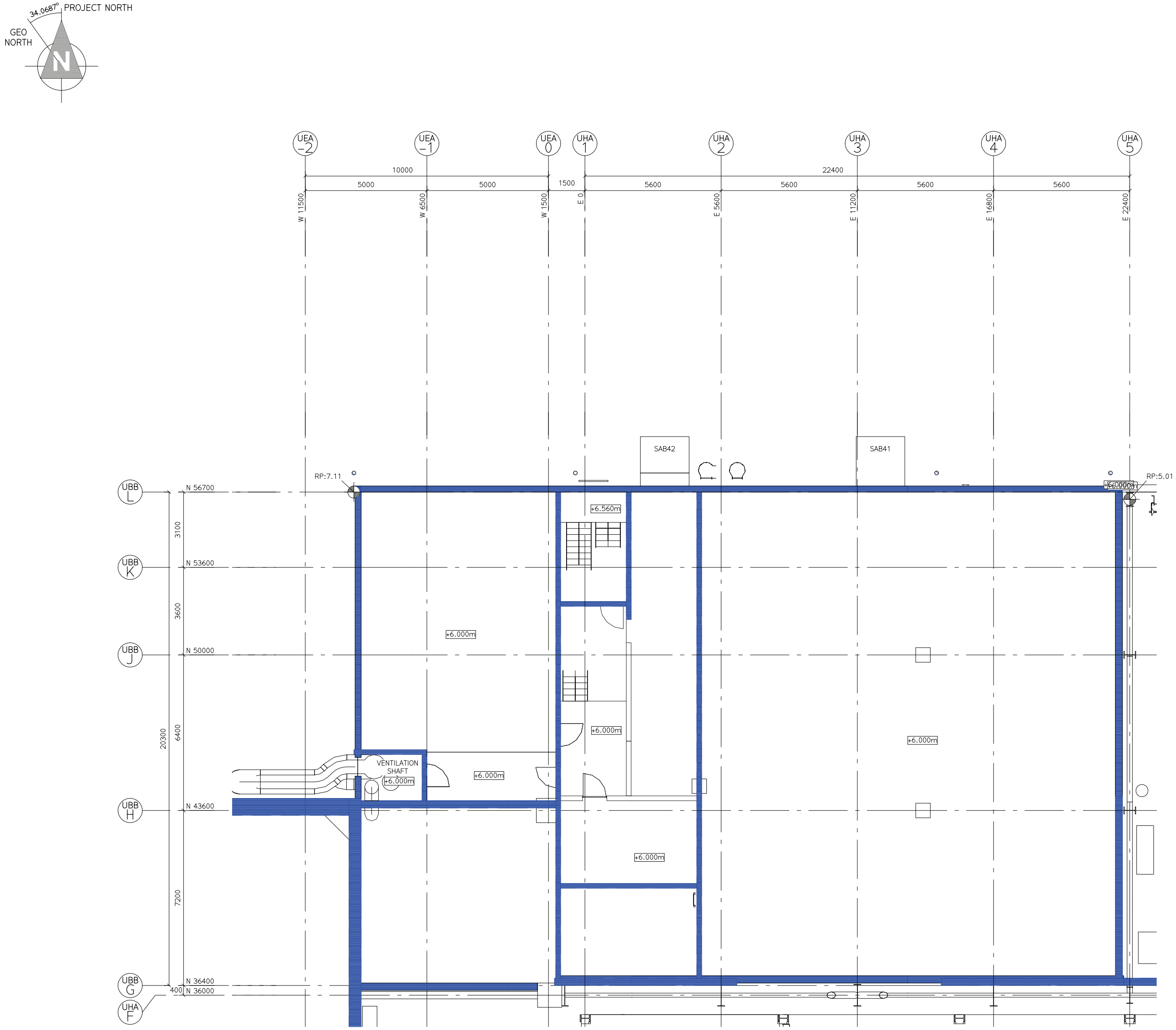
SUBJECT:
SERVICE BUILDING / EL ANNEX (UBB)
FIRE SEGREGATION
GROUND FLOOR PLAN, LEVEL: +0.000m

SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.:
2031 ; M4 ; J12 ; 103
PROJECT NO. GR. NO. SHT.

1
REV.

MECHANICAL EQUIPMENT		WEIGHT
SAB41	EL ANNEX MAIN AHU	unset kg
SAB42	EL ANNEX MAIN AHU	unset kg



LEGEND:

120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.08	MAGAV			

OWNER:

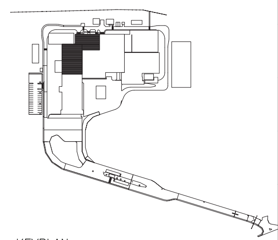
PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:



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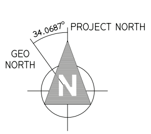
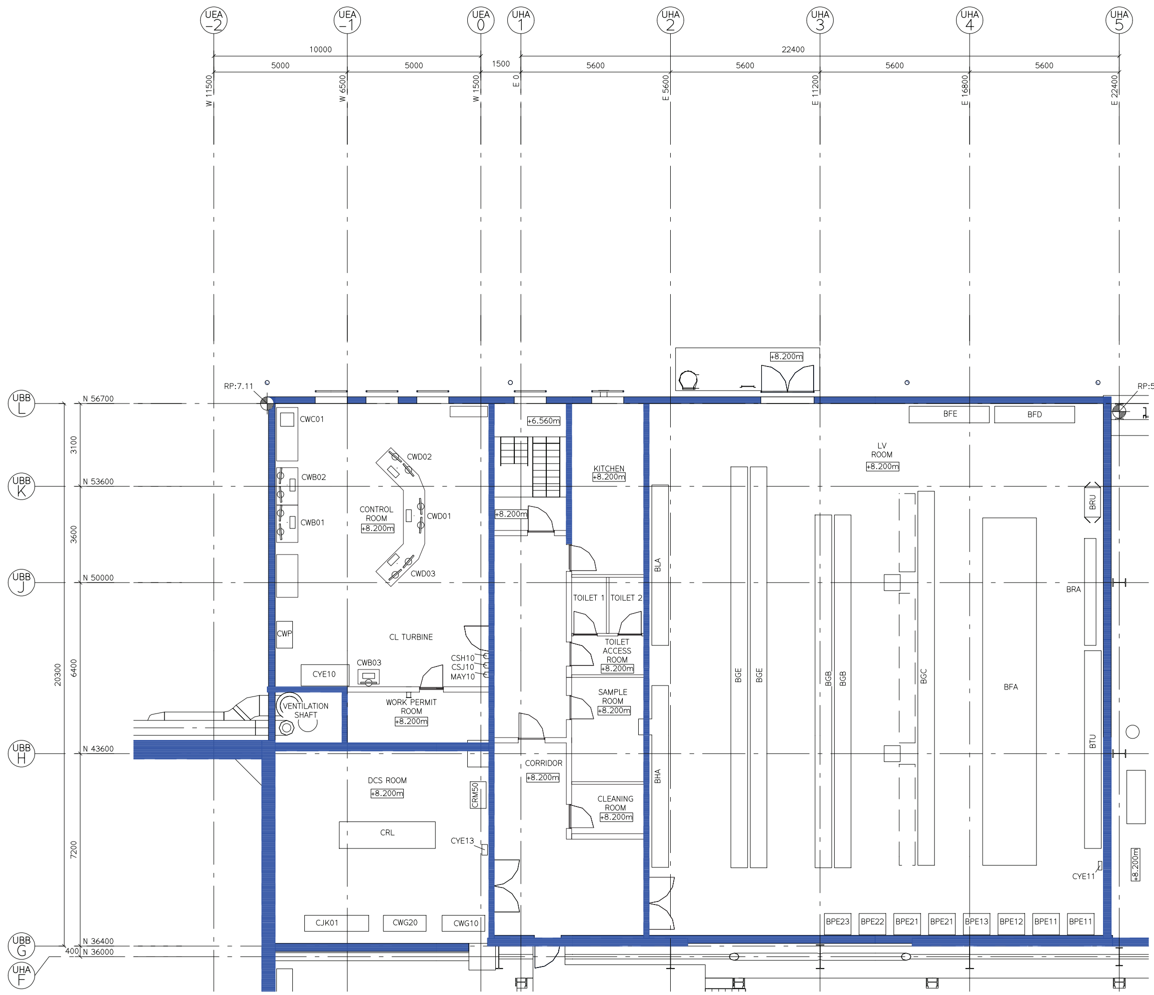
SUBJECT:
SERVICE BUILDING / EL ANNEX (UBB)
FIRE SEGREGATION
PLAN VIEW, LEVEL: +6.000m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J12 104 (PROJECT NO. / GR. / NO. / SHT.)

REV. 1





ELECTRICAL EQUIPMENT		WEIGHT
BFA	400 V LV MAIN DIST. SWBD.	13000 kg
BFD	690 V LV MAIN SWBD. NO. 1	3500 kg
BFE	690 V LV MAIN SWBD. NO. 2	3500 kg
BGB	BOILER SWBD. NO. 1	7000 kg
BGC	COMMON AUX SWBD.	7000 kg
BGE	FEEDER LINE & GASIFIER SWBD. NO. 2	8000 kg
BHA	BUILDING SERVICE SWBD.	2500 kg
BLA	L&SP SERVICE BUILDING (UBB)	1900 kg
BPE11	FEED WATER PUMP VFD 1A	800 kg
BPE11	FEED WATER PUMP VFD 1B	800 kg
BPE12	COMBUSTION AIR BLOWERS VFD 1	800 kg
BPE13	FLUIDIZING AIR BLOWERS VFD 1	800 kg
BPE21	FEED WATER PUMP VFD 2A	800 kg
BPE21	FEED WATER PUMP VFD 2B	800 kg
BPE22	COMBUSTION AIR BLOWER VFD 2	800 kg
BPE23	FLUIDIZING AIR BLOWERS VFD 2	800 kg
BRA	400 / 230 V UPS PANEL	1000 kg
BRU	UPS, UNIT	300 kg
BTU	110/24V DC PANEL	2500 kg
CJK01	TURBINE CONTROL PANEL 1	2000 kg
CRL	DCS CPU & SERVER PANEL	300 kg
CRM50	LV MAIN DCS RIO PANEL	300 kg
CSH10	EMG. STOP PUSH BUTTON	25 kg
CSJ10	EMG. STOP PUSH BUTTON	25 kg
CWB01	SHIFT MANAGER OPW3	25 kg
CWB02	STG OPERATOR	25 kg
CWB03	FIRE DETECTION STATION	25 kg
CWC01	PRINTERS	25 kg
CWD01	OPW1 CCTV	25 kg
CWD02	OPW2	25 kg
CWD03	OPW3 ENGINEER	25 kg
CWG10	GASIFIER CONTROL PANEL NO. 1	350 kg
CWG20	GASIFIER CONTROL PANEL NO. 2	350 kg
CWP	CONTROL PANELS	200 kg
CYE10	FIRE ALARM PANEL	200 kg
CYE11	INERT GAS PANEL, ELECTRICAL SWBD ROOM	10 kg
CYE13	INERT GAS PANEL, DCS EQUIPMENT ROOM	15 kg
MAY10	EMG. STOP PUSH BUTTON	25 kg

LEGEND:

120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)

REFERENCE:

2031:D2.721.001 SECTION A-A: LOOK NORTH
2031:D2.722.001 SECTION B-B: LOOK NORTH
2031:D2.723.001 SECTION C-C: LOOK NORTH
2031:D2.724.001 SECTION D-D: LOOK SOUTH
2031:D2.731.001 SECTION E-E: LOOK EAST
2031:D2.732.001 SECTION F-F: LOOK EAST
2031:D2.733.001 SECTION G-G: LOOK EAST
2031:D2.734.001 SECTION H-H: LOOK EAST

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.08	MAGAV			

OWNER:

PROJECT MANAGER:

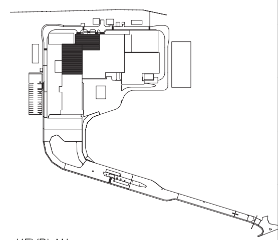
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:

SERVICE BUILDING / EL ANNEX (UBB)
FIRE SEGREGATION
PLAN VIEW, LEVEL: +8.200m

SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J12 105 (PROJECT NO. / GR. / NO. / SHT.)

REV. 1

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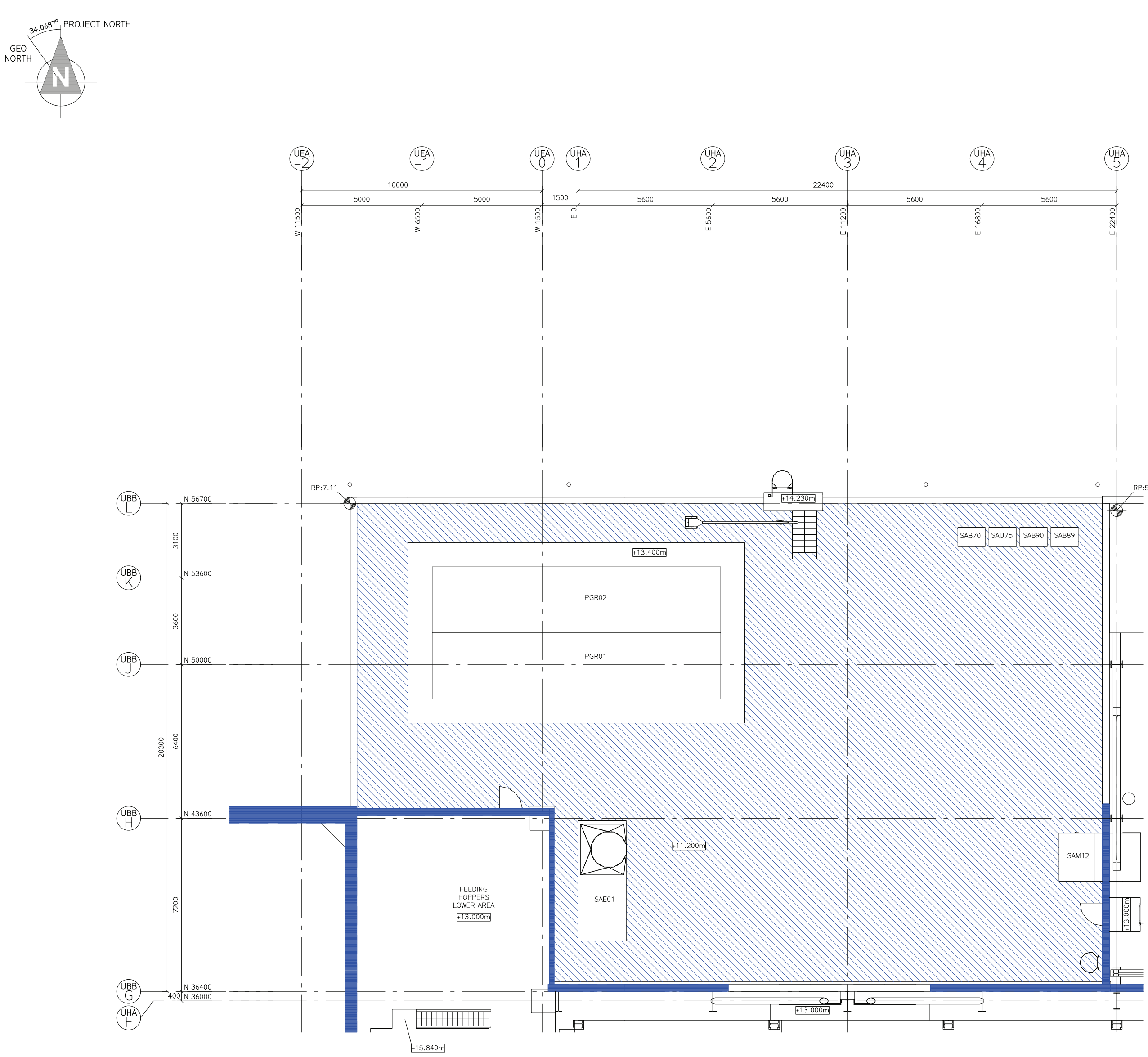


MECHANICAL EQUIPMENT

		WEIGHT
PGR01	RADIATOR COOLER UNIT 1	8500 kg
PGR02	RADIATOR COOLER UNIT 2	8500 kg
SAB70	CONDENSING UNIT 4	unset kg
SAB89	CONDENSING UNIT 1	unset kg
SAB90	CONDENSING UNIT 2	unset kg
SAE01	DIRTY EXTRACTION AHU	unset kg
SAM12	STG VENT. INTAKE	600 kg
SAU75	CONDENSING UNIT 3	unset kg

LEGEND:

- 120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)
- 120 MINUTES FIRE RESISTANT CONCRETE ROOF

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.08	MAGAV			

OWNER:

PROJECT MANAGER:

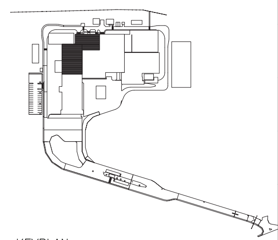
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:

SUBJECT: SERVICE BUILDING / EL ANNEX (UBB)
FIRE SEGREGATION
EL ANNEX MAIN ROOF PLAN



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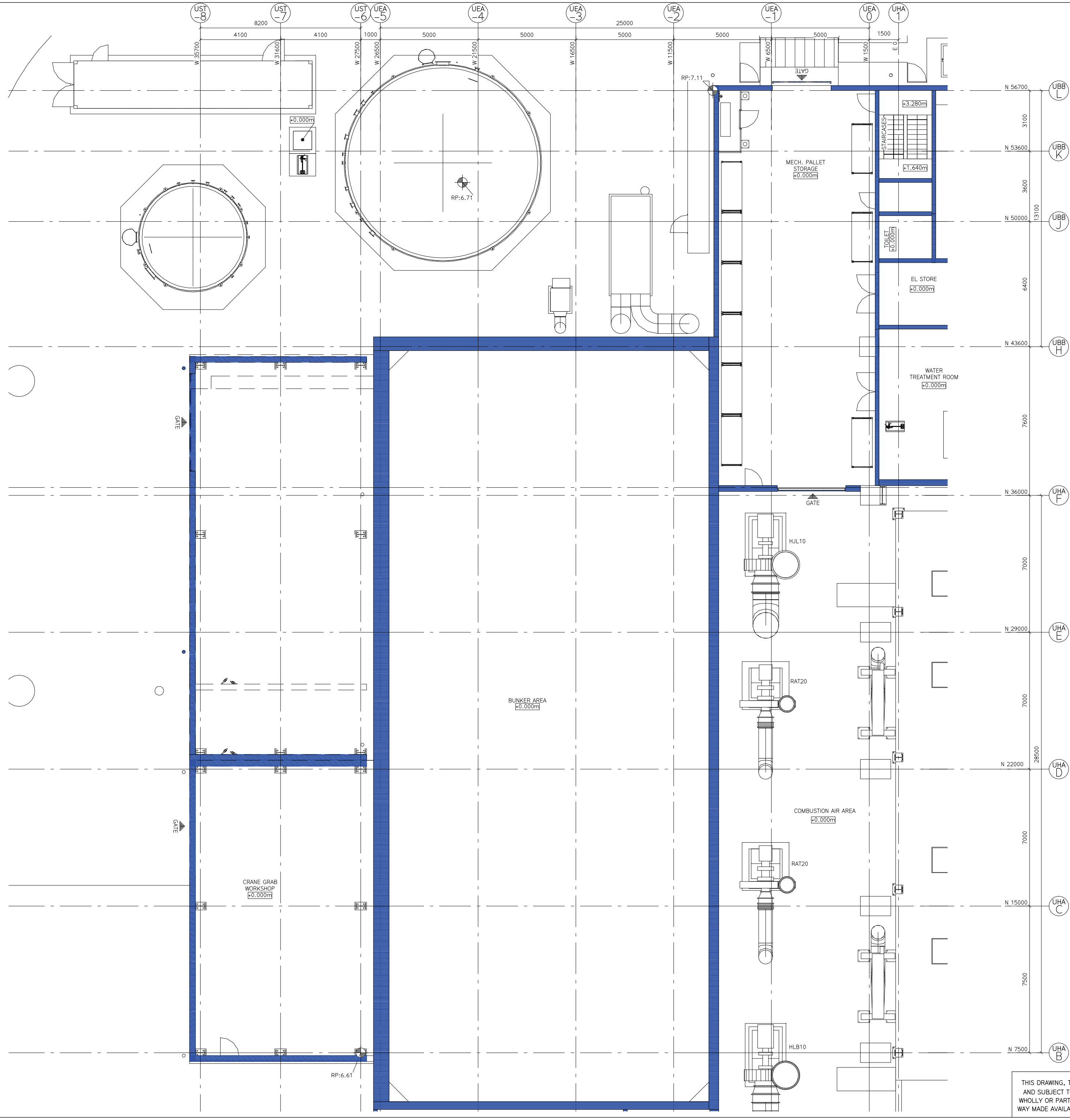
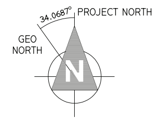
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 (PROJECT NO.) M4 (GR.) J12 (NO.) 106 (SHT.)

REV. 1





MECHANICAL EQUIPMENT		WEIGHT
HJL10	COMBUSTION AIR BLOWER	0 kg
HLB10	COMBUSTION AIR BLOWER	0 kg
RAT20	FLUIDIZING AIR BLOWER	0 kg

NOTE:. ONLY VALID FOR UEA PIT AREA

LEGEND:

- 120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)
- 120 MINUTES FIRE RESISTANT CONCRETE ROOF

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.08	MAGAV	FEMB		CNH

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

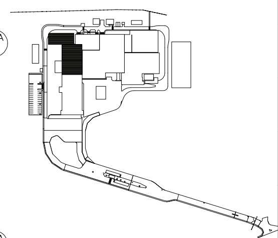
PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

WASTE FUEL STORAGE AREA (UEB)
FIRE SEGREGATION
GROUND FLOOR PLAN, LEVEL +0.000m



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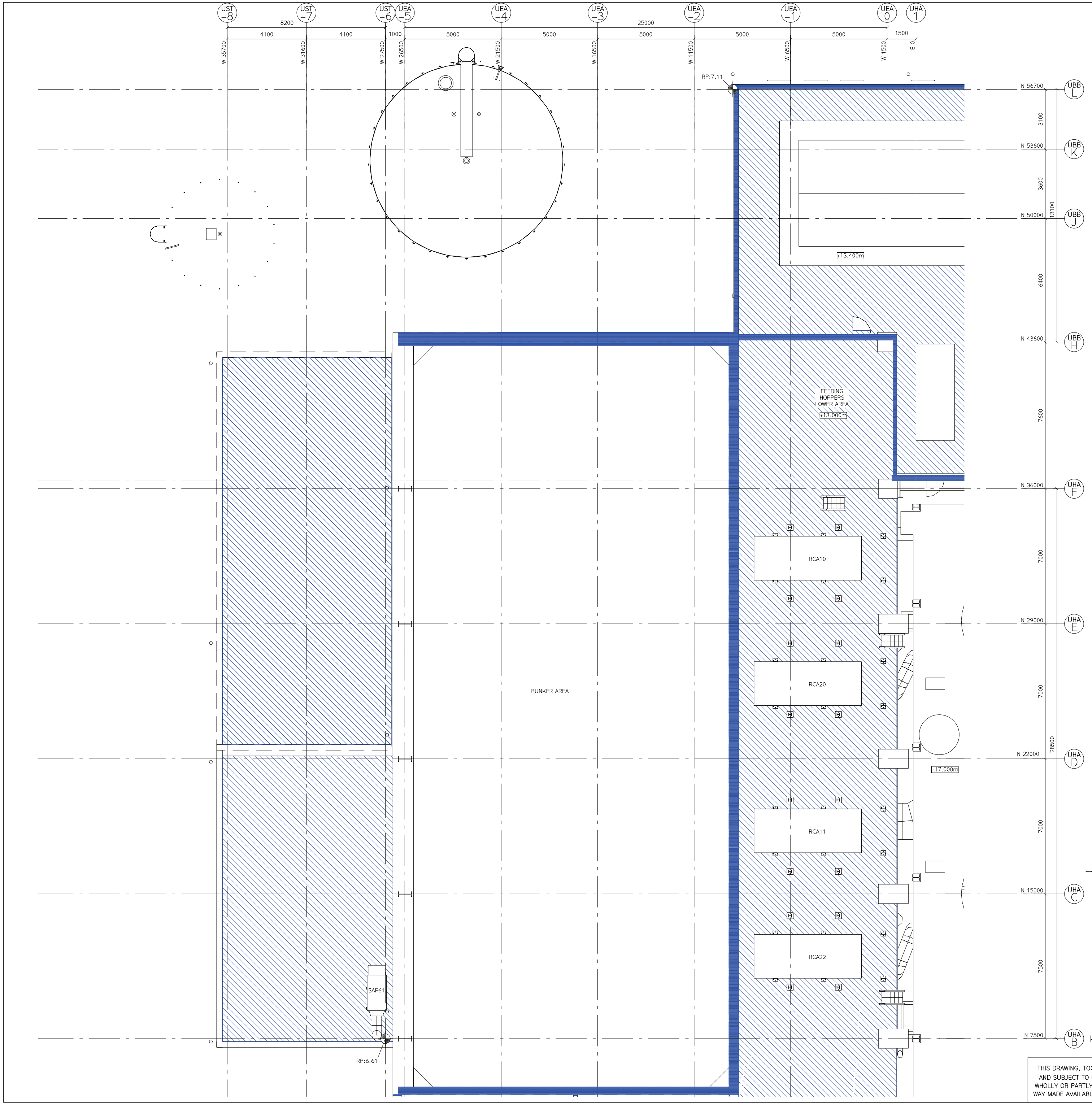
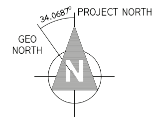
SCALE:
A1=1:100
A3=1:200

BWSC DWG.NO.:
2031 : M4 . J12 . 107
PROJECT NO. GR. NO. SHT.

1
REV.





MECHANICAL EQUIPMENT		WEIGHT
RCA10	WASTE FEEDER 1	0 kg
RCA11	WASTE FEEDER 1	0 kg
RCA20	WASTE FEEDER 2	0 kg
RCA22	WASTE FEEDER 2	0 kg
SAF61	SHREDDER SYSTEM AREA AHU INLET	400 kg

NOTE:. ONLY VALID FOR UEA PIT AREA

LEGEND:

- 120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)
- 120 MINUTES FIRE RESISTANT CONCRETE ROOF

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE

0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.08	MAGAV			

OWNER:

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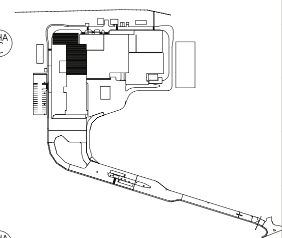
CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:


KEYPLAN

SUBJECT:

WASTE FUEL STORAGE AREA (UEB)

FIRE SEGREGATION

PLAN VIEW, LEVEL: +13.000m

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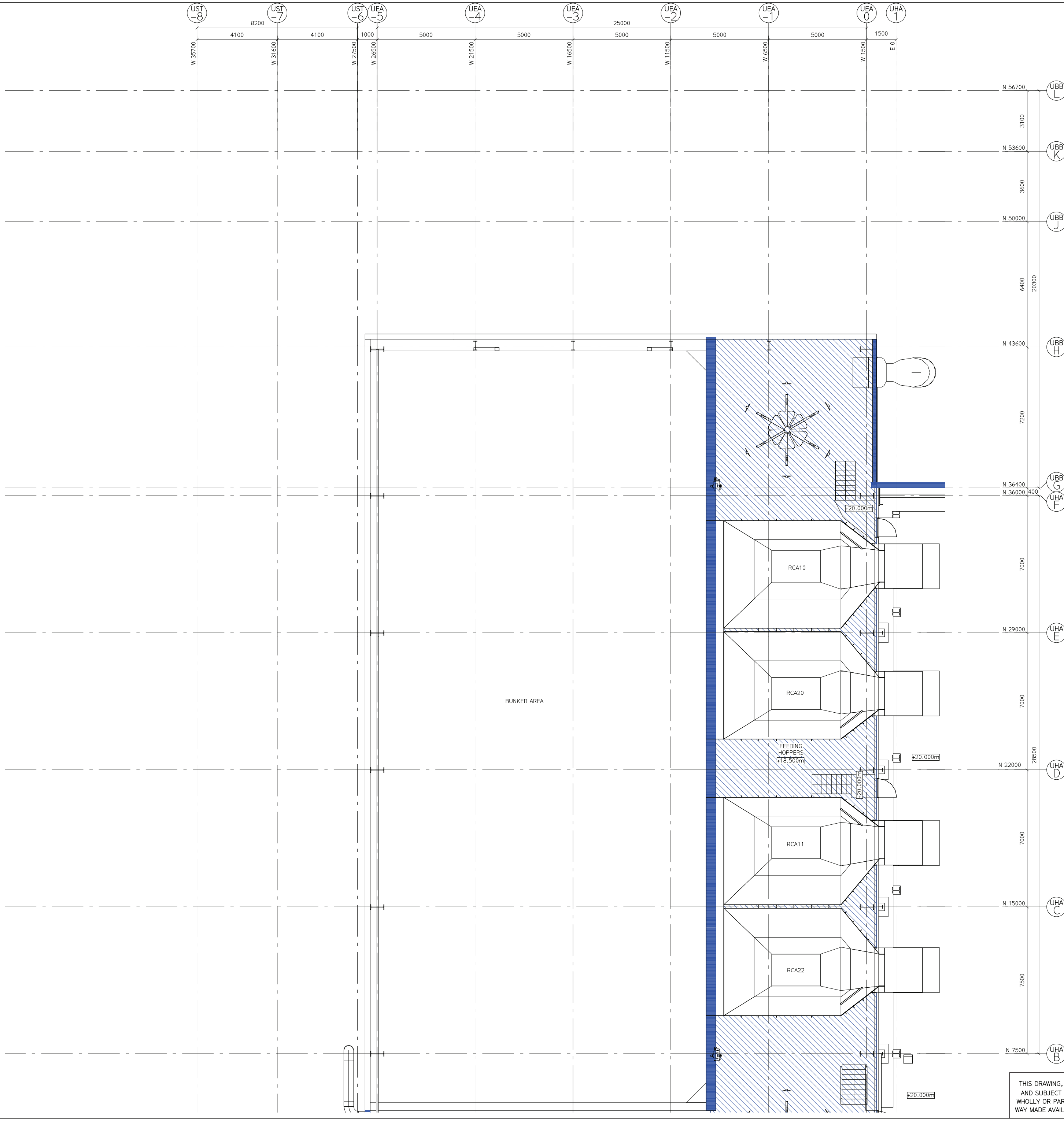
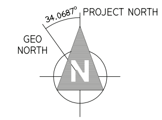
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 M4 J12 108 (PROJECT NO. / GR. / NO. / SHT.)

REV. 1





MECHANICAL EQUIPMENT		WEIGHT
RCA10	WASTE FEEDER 1	0 kg
RCA11	WASTE FEEDER 1	0 kg
RCA20	WASTE FEEDER 2	0 kg
RCA22	WASTE FEEDER 2	0 kg

NOTE:. ONLY VALID FOR UEA PIT AREA

LEGEND:

- 120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)
- 120 MINUTES FIRE RESISTANT CONCRETE ROOF

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm
NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 2 4 6 8 10

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
1	2018.12.14	CAGCX			
0	2018.10.11	CAGCX			

OWNER:

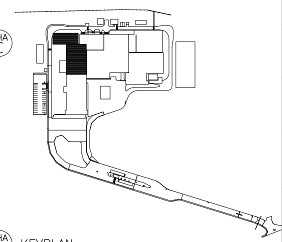
PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT: **HOOTON BIO POWER PROJECT**

SUB-CONTRACTOR:



KEYPLAN

SUBJECT:
WASTE FUEL STORAGE AREA (UEB)
FIRE SEGREGATION
PLAN VIEW, LEVEL: +18.500m

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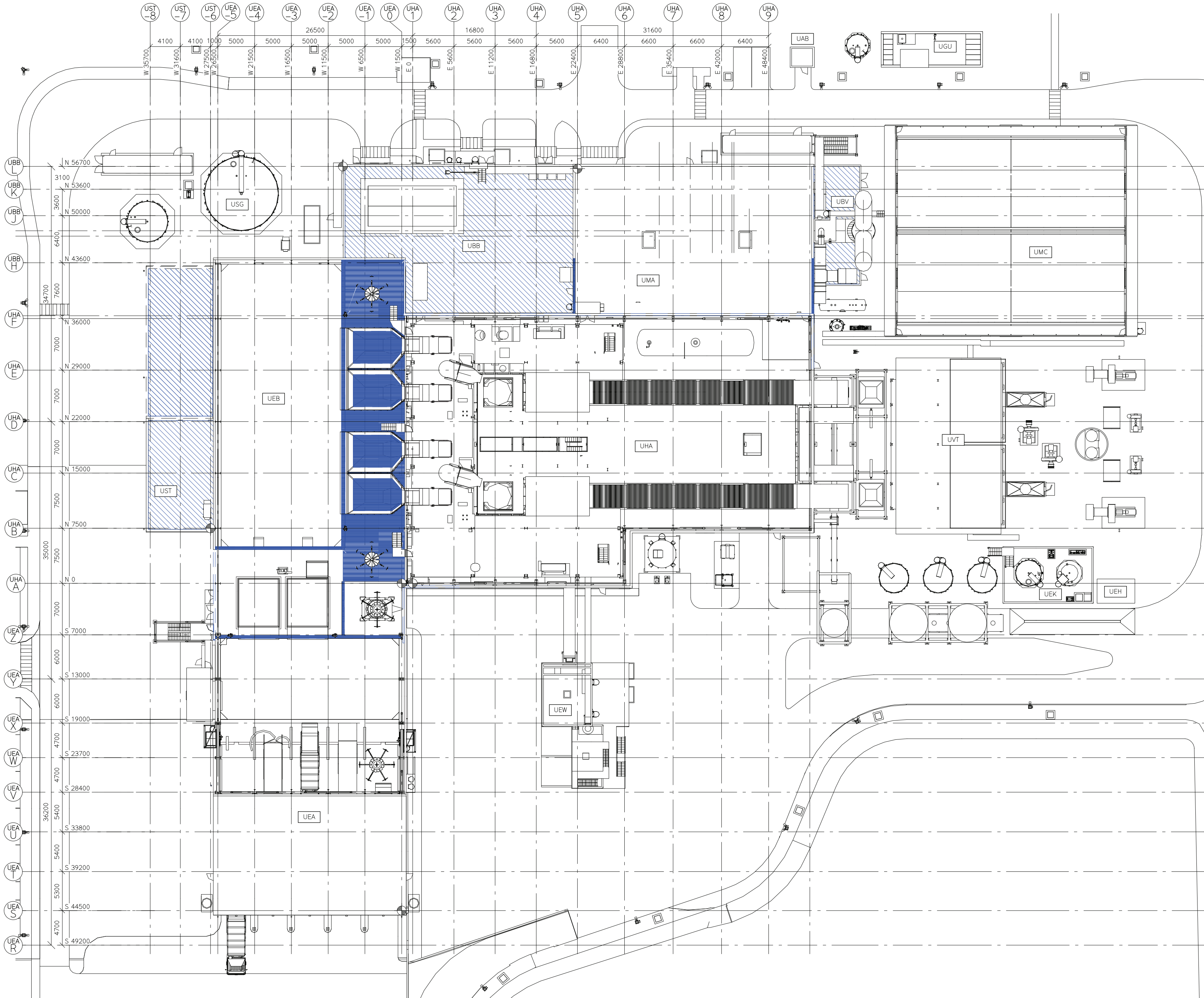
SCALE: A1=1:100 A3=1:200

BWSC DWG.NO.: 2031 ; M4 ; J12 ; 109 (PROJECT NO. ; GR. ; NO. ; SHT.)

REV. 1



UAB	11kV SUBSTATION
UBB	EL ANNEX & SERVICE BUILDING
UBV	ACC & TURBINE BUILDING EL ROOM
UEA	WASTE FUEL UNLOADING AREA
UEB	WASTE FUEL STORAGE AREA
UEH	DO & AMMONIA UNLOADING AREA
UEK	DO & AMMONIA TANK AREA
UEW	SLAG STORAGE AREA
UGU	EFFLUENT AREA
UHA	BOILER BUILDING
UMA	STEAM TURBINE BUILDING
UMC	AIR COOLED CONDENSER AREA (ACC)
USG	FIRE EQUIPMENT AREA
UST	WORKSHOP BUILDING
UVT	FLUE GAS TREATMENT AREA (FGT)

LEGEND:

- 120 MINUTES FIRE RESISTING CONSTRUCTION (E.G. CONCRETE, BLOCK STONE) FOR FIRE SEGREGATION (NFPA RECOMENDATIONS)
- 120 MINUTES FIRE RESISTANT CONCRETE ROOF

GENERAL NOTES:

NO.: 1. ALL MEASUREMENT IN mm

NO.: 2. ALL LEVELS ARE RELATIVE IN METRE

METRE 0 5 10 15 20 25

PRELIMINARY

REV	DATE	DRAWN BY	CHECKED BY	DESCRIPTION	APPROVED BY
0	2018.10.12	CAGCX			

OWNER:

PROJECT MANAGER:

CONTRACTOR:

TECHNOLOGY PROVIDER:

PROJECT:

HOOTON BIO POWER PROJECT

SUB-CONTRACTOR:

SUBJECT:

MAIN BUILDING

FIRE SEGREGATION

PLAN, LEVEL +18.500

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SCALE: A1=1:250 A3=1:500

BWSC DWG.NO.: 2031 M4 J12 110 (PROJECT NO. GR. NO. SHT.)

REV. 0

Calculation

Basic information

Client:	BWSC
Scenario name:	Part I
Consultant:	Rambøll
Reference no.:	
Company type:	Industry, chemical
Basic bldg. construction:	Brick-wall/concrete-roof
Last revision:	12-12-2018 14:27:23
Revision No.:	40

Calculation options

Post flash-over model enabled:	x
Time limit [min]:	60
Plumemodel:	Heskestad

Fire brigade

Fire brigade active:	-
City area:	-
24 hour:	-
Distance/fire station [km]:	10,0
Calculated response time [min]:	15
Time before manual alarm [min]:	40

Fire start

Fire start room:	Part I
Fire start, type:	Energy formula fire
Fire start, name:	5,5 MW Fast
Fire start, code:	-
Optical smoke potential [dB/m]:	100,0
Maximum Q(t) [MW]:	5,50
Parabolic growth [MW/min²]:	0,1692
Parabolic growth [kW/s²]:	0,0470
Linear growth [MW/min]:	0,0000
Constant fire [MW]:	0,0000
Initial fire [kW]:	0,00
Doubling time [min]:	0,00

Fire installations

	[---------- In operation ----------]						
Room name	AFV Heat	AFV Smoke	AFV Timer	Sprinkler	AFA Heat	AFA Smoke	Windload [m/s]
Part I	-	-	-	-	-	-	0,00
Part II	-	-	-	-	-	-	0,00

Events

Fire progression:
Energy formula fire > 5,5 MW Fast
Plumemodel > Heskestad
00:09:40 : Critical condition in room 'Part II': Smoke free height less than 4,00 m
00:10:11 : Critical condition in room 'Part I': Smoke free height less than 5,20 m
00:17:24 : Room 'Part II' is now filled with smoke
00:31:47 : Room 'Part I' is now filled with smoke
00:40:00 : Fire brigade is alarmed
00:55:00 : Fire brigade arrived, preparing extinguishing
00:56:00 : Fire brigade ready, extinguishing started
00:56:31 : Fire is declining
00:59:15 : Fire has been put out

RHR and smoke layer temperature in all rooms

Time	*Rate of heat release [kW]*	[------ Smoke layer temp. [ºC] ------]	
		Part I	*Part II*
00:00:00	0	20	20
00:00:09	4	20	20
00:00:19	18	20	20
00:00:28	39	20	20
00:00:38	70	20	20
00:00:48	111	20	20
00:00:58	160	20	20
00:01:07	216	20	20
00:01:17	279	20	20
00:01:27	356	20	20
00:01:36	439	20	20
00:01:45	528	20	20
00:01:55	624	22	20
00:02:05	737	22	20
00:02:14	854	22	20
00:02:24	975	22	20
00:02:33	1.111	22	20
00:02:43	1.251	23	20
00:02:53	1.408	23	20
00:03:02	1.569	23	20
00:03:12	1.735	23	20
00:03:22	1.920	24	20
00:03:31	2.112	24	20
00:03:41	2.314	24	20
00:03:51	2.521	25	23
00:04:01	2.734	25	24
00:04:10	2.961	26	24
00:04:20	3.199	26	24
00:04:30	3.442	26	24
00:04:40	3.689	27	25
00:04:49	3.946	27	25
00:04:59	4.216	28	25
00:05:09	4.493	29	25
00:05:18	4.774	29	26
00:05:28	5.076	30	26
00:05:38	5.383	30	26
00:05:48	5.500	31	27
00:05:58	5.500	31	27
00:06:07	5.500	32	27
00:06:16	5.500	32	28
00:06:24	5.500	32	28
00:06:34	5.500	33	29
00:06:44	5.500	33	29
00:06:52	5.500	34	29
00:07:00	5.500	34	30
00:07:09	5.500	34	30
00:07:18	5.500	35	30

00:07:28	5.500	35	31
00:07:38	5.500	35	31
00:07:46	5.500	35	31
00:07:53	5.500	36	32
00:08:02	5.500	36	32
00:08:10	5.500	36	32
00:08:18	5.500	36	32
00:08:27	5.500	37	33
00:08:36	5.500	37	33
00:08:46	5.500	37	33
00:08:55	5.500	38	34
00:09:05	5.500	38	34
00:09:12	5.500	38	34
00:09:19	5.500	38	34
00:09:26	5.500	39	35
00:09:33	5.500	39	35
00:09:40	5.500	39	35
00:09:40		Critical condition in room 'Part II': Smoke free height less than 4,00 m	
00:09:48	5.500	39	35
00:09:55	5.500	39	36
00:10:03	5.500	40	36
00:10:11	5.500	40	36
00:10:11		Critical condition in room 'Part I': Smoke free height less than 5,20 m	
00:10:19	5.500	40	36
00:10:27	5.500	40	37
00:10:35	5.500	41	37
00:10:44	5.500	41	37
00:10:52	5.500	41	37
00:11:01	5.500	41	38
00:11:10	5.500	42	38
00:11:19	5.500	42	38
00:11:28	5.500	42	38
00:11:35	5.500	42	39
00:11:42	5.500	43	39
00:11:50	5.500	43	39
00:11:58	5.500	43	39
00:12:06	5.500	43	40
00:12:14	5.500	44	40
00:12:22	5.500	44	40
00:12:30	5.500	44	40
00:12:39	5.500	44	41
00:12:47	5.500	44	41
00:12:55	5.500	45	41
00:13:03	5.500	45	41
00:13:12	5.500	45	42
00:13:20	5.500	45	42
00:13:28	5.500	46	42
00:13:36	5.500	46	42
00:13:44	5.500	46	43
00:13:52	5.500	46	43
00:14:00	5.500	47	43
00:14:08	5.500	47	43
00:14:16	5.500	47	43
00:14:25	5.500	47	44
00:14:33	5.500	48	44
00:14:42	5.500	48	44
00:14:51	5.500	48	44
00:15:00	5.500	48	45
00:15:10	5.500	49	45

00:15:15	5.500	49	45
00:15:20	5.500	49	45
00:15:26	5.500	49	46
00:15:31	5.500	49	46
00:15:37	5.500	50	46
00:15:43	5.500	50	46
00:15:49	5.500	50	46
00:15:55	5.500	50	46
00:16:01	5.500	50	47
00:16:08	5.500	51	47
00:16:13	5.500	51	47
00:16:21	5.500	51	47
00:16:29	5.500	51	47
00:16:35	5.500	51	48
00:16:40	5.500	52	48
00:16:49	5.500	52	48
00:16:57	5.500	52	48
00:17:07	5.500	52	49
00:17:16	5.500	53	49
00:17:24	5.500	53	49
00:17:24		Room 'Part II' is now filled with smoke	
00:17:33	5.500	53	49
00:17:43	5.500	54	50
00:17:51	5.500	54	50
00:18:00	5.500	54	50
00:18:09	5.500	54	51
00:18:18	5.500	55	51
00:18:27	5.500	55	51
00:18:36	5.500	55	51
00:18:45	5.500	56	52
00:18:54	5.500	56	52
00:19:03	5.500	56	52
00:19:12	5.500	56	52
00:19:21	5.500	57	53
00:19:30	5.500	57	53
00:19:38	5.500	57	53
00:19:47	5.500	58	54
00:19:56	5.500	58	54
00:20:05	5.500	58	54
00:20:14	5.500	58	54
00:20:23	5.500	59	55
00:20:31	5.500	59	55
00:20:40	5.500	59	55
00:20:49	5.500	59	55
00:20:58	5.500	60	56
00:21:06	5.500	60	56
00:21:15	5.500	60	56
00:21:24	5.500	61	57
00:21:33	5.500	61	57
00:21:42	5.500	61	57
00:21:50	5.500	61	57
00:21:59	5.500	62	58
00:22:08	5.500	62	58
00:22:16	5.500	62	58
00:22:25	5.500	62	58
00:22:34	5.500	63	59
00:22:42	5.500	63	59
00:22:51	5.500	63	59
00:23:00	5.500	64	60

00:23:08	5.500	64	60
00:23:17	5.500	64	60
00:23:26	5.500	64	60
00:23:34	5.500	65	61
00:23:43	5.500	65	61
00:23:52	5.500	65	61
00:24:00	5.500	65	61
00:24:09	5.500	66	62
00:24:18	5.500	66	62
00:24:26	5.500	66	62
00:24:35	5.500	66	62
00:24:43	5.500	67	63
00:24:52	5.500	67	63
00:25:00	5.500	67	63
00:25:09	5.500	67	63
00:25:17	5.500	68	64
00:25:26	5.500	68	64
00:25:35	5.500	68	64
00:25:43	5.500	69	64
00:25:52	5.500	69	65
00:26:00	5.500	69	65
00:26:09	5.500	69	65
00:26:17	5.500	70	65
00:26:26	5.500	70	66
00:26:34	5.500	70	66
00:26:43	5.500	70	66
00:26:51	5.500	71	66
00:27:00	5.500	71	67
00:27:08	5.500	71	67
00:27:16	5.500	71	67
00:27:25	5.500	72	67
00:27:33	5.500	72	68
00:27:42	5.500	72	68
00:27:50	5.500	72	68
00:27:58	5.500	73	68
00:28:07	5.500	73	69
00:28:15	5.500	73	69
00:28:24	5.500	73	69
00:28:32	5.500	74	69
00:28:40	5.500	74	70
00:28:49	5.500	74	70
00:28:57	5.500	74	70
00:29:05	5.500	75	70
00:29:14	5.500	75	71
00:29:22	5.500	75	71
00:29:30	5.500	75	71
00:29:39	5.500	76	71
00:29:47	5.500	76	72
00:29:55	5.500	76	72
00:30:04	5.500	76	72
00:30:12	5.500	77	72
00:30:20	5.500	77	73
00:30:29	5.500	77	73
00:30:37	5.500	77	73
00:30:45	5.500	78	73
00:30:53	5.500	78	74
00:31:02	5.500	78	74
00:31:10	5.500	78	74
00:31:18	5.500	79	74

00:31:26	5.500	79	75
00:31:35	5.500	79	75
00:31:43	5.500	79	75
00:31:47	5.500	79	75
00:31:47		Room 'Part I' is now filled with smoke	
00:31:55	5.500	80	75
00:32:03	5.500	80	76
00:32:12	5.500	80	76
00:32:20	5.500	80	76
00:32:28	5.500	81	76
00:32:36	5.500	81	77
00:32:44	5.500	81	77
00:32:52	5.500	81	77
00:33:01	5.500	82	77
00:33:09	5.500	82	78
00:33:17	5.500	82	78
00:33:25	5.500	82	78
00:33:33	5.500	83	78
00:33:41	5.500	83	78
00:33:49	5.500	83	79
00:33:57	5.500	83	79
00:34:06	5.500	83	79
00:34:14	5.500	84	79
00:34:22	5.500	84	80
00:34:30	5.500	84	80
00:34:38	5.500	84	80
00:34:46	5.500	85	80
00:34:54	5.500	85	81
00:35:02	5.500	85	81
00:35:10	5.500	85	81
00:35:18	5.500	86	81
00:35:26	5.500	86	81
00:35:34	5.500	86	82
00:35:42	5.500	86	82
00:35:50	5.500	87	82
00:35:58	5.500	87	82
00:36:06	5.500	87	83
00:36:14	5.500	87	83
00:36:22	5.500	87	83
00:36:30	5.500	88	83
00:36:38	5.500	88	84
00:36:46	5.500	88	84
00:36:54	5.500	88	84
00:37:02	5.500	89	84
00:37:10	5.500	89	84
00:37:18	5.500	89	85
00:37:26	5.500	89	85
00:37:34	5.500	89	85
00:37:42	5.500	90	85
00:37:50	5.500	90	86
00:37:58	5.500	90	86
00:38:06	5.500	90	86
00:38:14	5.500	91	86
00:38:22	5.500	91	86
00:38:29	5.500	91	87
00:38:37	5.500	91	87
00:38:45	5.500	92	87
00:38:53	5.500	92	87
00:39:01	5.500	92	88

00:39:09	5.500	92	88
00:39:17	5.500	92	88
00:39:25	5.500	93	88
00:39:32	5.500	93	88
00:39:40	5.500	93	89
00:39:48	5.500	93	89
00:39:56	5.500	94	89
00:40:00	5.500	94	89
00:40:00		Fire brigade is alarmed	
00:40:07	5.500	94	89
00:40:15	5.500	94	90
00:40:23	5.500	94	90
00:40:31	5.500	95	90
00:40:39	5.500	95	90
00:40:46	5.500	95	91
00:40:54	5.500	95	91
00:41:02	5.500	95	91
00:41:10	5.500	96	91
00:41:18	5.500	96	91
00:41:25	5.500	96	92
00:41:33	5.500	96	92
00:41:41	5.500	96	92
00:41:49	5.500	97	92
00:41:56	5.500	97	92
00:42:04	5.500	97	93
00:42:12	5.500	97	93
00:42:20	5.500	98	93
00:42:27	5.500	98	93
00:42:35	5.500	98	94
00:42:43	5.500	98	94
00:42:50	5.500	98	94
00:42:58	5.500	99	94
00:43:06	5.500	99	94
00:43:14	5.500	99	95
00:43:21	5.500	99	95
00:43:29	5.500	99	95
00:43:37	5.500	100	95
00:43:44	5.500	100	95
00:43:52	5.500	100	96
00:44:00	5.500	100	96
00:44:07	5.500	101	96
00:44:15	5.500	101	96
00:44:23	5.500	101	96
00:44:30	5.500	101	97
00:44:38	5.500	101	97
00:44:46	5.500	102	97
00:44:53	5.500	102	97
00:45:01	5.500	102	98
00:45:08	5.500	102	98
00:45:16	5.500	102	98
00:45:24	5.500	103	98
00:45:31	5.500	103	98
00:45:39	5.500	103	99
00:45:46	5.500	103	99
00:45:54	5.500	103	99
00:46:02	5.500	104	99
00:46:09	5.500	104	99
00:46:17	5.500	104	100
00:46:24	5.500	104	100

00:46:32	5.500	105	100
00:46:39	5.500	105	100
00:46:47	5.500	105	100
00:46:54	5.500	105	101
00:47:02	5.500	105	101
00:47:10	5.500	106	101
00:47:17	5.500	106	101
00:47:25	5.500	106	101
00:47:32	5.500	106	102
00:47:40	5.500	106	102
00:47:47	5.500	107	102
00:47:55	5.500	107	102
00:48:02	5.500	107	102
00:48:10	5.500	107	103
00:48:17	5.500	107	103
00:48:25	5.500	108	103
00:48:32	5.500	108	103
00:48:40	5.500	108	103
00:48:47	5.500	108	104
00:48:55	5.500	108	104
00:49:02	5.500	109	104
00:49:10	5.500	109	104
00:49:17	5.500	109	104
00:49:24	5.500	109	105
00:49:32	5.500	109	105
00:49:39	5.500	110	105
00:49:47	5.500	110	105
00:49:54	5.500	110	105
00:50:02	5.500	110	106
00:50:09	5.500	110	106
00:50:16	5.500	111	106
00:50:24	5.500	111	106
00:50:31	5.500	111	106
00:50:39	5.500	111	107
00:50:46	5.500	111	107
00:50:54	5.500	112	107
00:51:01	5.500	112	107
00:51:08	5.500	112	107
00:51:16	5.500	112	108
00:51:23	5.500	112	108
00:51:30	5.500	113	108
00:51:38	5.500	113	108
00:51:45	5.500	113	108
00:51:52	5.500	113	109
00:52:00	5.500	113	109
00:52:07	5.500	114	109
00:52:14	5.500	114	109
00:52:22	5.500	114	109
00:52:29	5.500	114	109
00:52:37	5.500	114	110
00:52:44	5.500	115	110
00:52:51	5.500	115	110
00:52:58	5.500	115	110
00:53:06	5.500	115	110
00:53:13	5.500	115	111
00:53:20	5.500	116	111
00:53:28	5.500	116	111
00:53:35	5.500	116	111
00:53:42	5.500	116	111

00:53:50	5.500	116	112
00:53:57	5.500	116	112
00:54:04	5.500	117	112
00:54:11	5.500	117	112
00:54:19	5.500	117	112
00:54:26	5.500	117	113
00:54:33	5.500	117	113
00:54:41	5.500	118	113
00:54:48	5.500	118	113
00:54:55	5.500	118	113
00:55:00	5.500	118	113
00:55:00		Fire brigade arrived, preparing extinguishing	
00:55:07	5.500	118	114
00:55:14	5.500	118	114
00:55:21	5.500	119	114
00:55:28	5.500	119	114
00:55:36	5.500	119	114
00:55:43	5.500	119	114
00:55:50	5.500	119	115
00:56:00	5.500	120	115
00:56:00		Fire brigade ready, extinguishing started	
00:56:07	5.500	120	115
00:56:14	5.500	120	115
00:56:21	5.500	120	115
00:56:30	5.500	120	116
00:56:31	5.441	120	116
00:56:31		Fire is declining	
00:56:41	5.124	121	116
00:56:50	4.808	121	116
00:57:00	4.491	121	116
00:57:09	4.175	121	117
00:57:19	3.858	121	117
00:57:28	3.542	121	117
00:57:38	3.226	121	117
00:57:47	2.909	121	117
00:57:57	2.593	121	117
00:58:06	2.276	121	117
00:58:16	1.960	120	117
00:58:25	1.643	120	117
00:58:35	1.327	120	117
00:58:45	995	120	117
00:58:54	679	119	117
00:59:04	363	119	116
00:59:13	46	118	116
00:59:15	0	118	116
00:59:15		Fire has been put out	

Simulation results for each room

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:00:00	0,00		36,00	20		-0,010
00:00:09	0,00		36,00	20		0,000
00:00:19	0,00		36,00	20		0,000
00:00:28	0,00		36,00	20		0,000
00:00:38	0,00		36,00	20		0,000
00:00:48	0,00		36,00	20		0,000
00:00:58	0,00		36,00	20		0,000
00:01:07	0,00		36,00	20		0,000
00:01:17	0,01		36,00	20		0,000
00:01:27	0,01		36,00	20		0,000
00:01:36	0,01		36,00	20		0,000
00:01:45	0,01		36,00	20		0,000
00:01:55	0,01	0,11	34,87	22		0,083
00:02:05	0,01	0,12	33,37	22	0,09	0,115
00:02:14	0,01	0,13	31,95	22	0,10	0,154
00:02:24	0,01	0,14	30,61	22	0,10	0,199
00:02:33	0,01	0,15	29,23	22	0,11	0,258
00:02:43	0,01	0,17	27,93	23	0,12	0,325
00:02:53	0,01	0,18	26,61	23	0,13	0,409
00:03:02	0,01	0,19	25,37	23	0,14	0,505
00:03:12	0,01	0,21	24,20	23	0,15	0,614
00:03:22	0,01	0,23	23,03	24	0,16	0,712
00:03:31	0,01	0,25	22,01	24	0,16	0,767
00:03:41	0,01	0,27	21,15	24	0,17	0,801
00:03:51	0,01	0,29	20,46	25	0,18	1,197
00:04:01	0,01	0,31	19,91	25	0,19	1,395
00:04:10	0,01	0,33	19,44	26	0,19	1,623
00:04:20	0,01	0,36	19,04	26	0,20	1,881
00:04:30	0,01	0,38	18,66	26	0,20	2,165
00:04:40	0,01	0,41	18,28	27	0,21	2,474
00:04:49	0,01	0,44	17,84	27	0,21	2,821
00:04:59	0,01	0,47	17,34	28	0,22	3,208
00:05:09	0,01	0,50	16,83	29	0,23	3,627
00:05:18	0,01	0,53	16,31	29	0,24	4,077
00:05:28	0,01	0,56	15,78	30	0,25	4,587
00:05:38	0,01	0,59	15,25	30	0,26	5,134
00:05:48	0,01	0,62	14,71	31	0,26	5,253
00:05:58	0,01	0,65	14,19	31	0,27	5,116
00:06:07	0,01	0,68	13,69	32	0,28	4,990
00:06:16	0,01	0,71	13,26	32	0,29	4,888
00:06:24	0,01	0,73	12,81	32	0,30	4,788
00:06:34	0,01	0,75	12,36	33	0,31	4,689
00:06:44	0,01	0,78	11,89	33	0,32	4,593
00:06:52	0,01	0,80	11,51	34	0,32	4,517
00:07:00	0,01	0,82	11,13	34	0,33	4,443
00:07:09	0,01	0,84	10,74	34	0,34	4,370
00:07:18	0,01	0,86	10,35	35	0,35	4,299
00:07:28	0,01	0,88	9,97	35	0,35	4,230
00:07:38	0,01	0,91	9,58	35	0,36	4,162
00:07:46	0,01	0,92	9,29	35	0,37	4,112
00:07:53	0,01	0,94	9,01	36	0,37	4,063
00:08:02	0,01	0,96	8,72	36	0,38	4,015
00:08:10	0,01	0,98	8,43	36	0,39	3,967

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:18	0,01	1,00	8,15	36	0,39	3,920
00:08:27	0,01	1,02	7,87	37	0,40	3,874
00:08:36	0,01	1,04	7,59	37	0,40	3,829
00:08:46	0,01	1,06	7,31	37	0,41	3,785
00:08:55	0,01	1,08	7,03	38	0,41	3,741
00:09:05	0,01	1,10	6,75	38	0,42	3,698
00:09:12	0,01	1,11	6,57	38	0,42	3,669
00:09:19	0,01	1,13	6,39	38	0,43	3,641
00:09:26	0,01	1,14	6,20	39	0,43	3,613
00:09:33	0,01	1,16	6,02	39	0,44	3,585
00:09:40	0,01	1,18	5,84	39	0,44	3,558
00:09:40	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:09:48	0,01	1,19	5,66	39	0,44	3,530
00:09:55	0,01	1,21	5,49	39	0,45	3,503
00:10:03	0,01	1,22	5,31	40	0,45	3,476
00:10:11	0,01	1,24	5,13	40	0,45	3,449
00:10:11	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:10:19	0,01	1,26	4,96	40	0,46	3,423
00:10:27	0,01	1,28	4,78	40	0,46	3,397
00:10:35	0,01	1,29	4,61	41	0,46	3,370
00:10:44	0,01	1,31	4,44	41	0,47	3,345
00:10:52	0,01	1,33	4,27	41	0,47	3,319
00:11:01	0,01	1,35	4,10	41	0,48	3,293
00:11:10	0,01	1,37	3,93	42	0,48	3,268
00:11:19	0,01	1,39	3,76	42	0,48	3,242
00:11:28	0,01	1,41	3,61	42	0,49	3,212
00:11:35	0,01	1,42	3,49	42	0,49	3,184
00:11:42	0,01	1,44	3,36	43	0,49	3,152
00:11:50	0,01	1,45	3,24	43	0,49	3,117
00:11:58	0,01	1,47	3,11	43	0,50	3,080
00:12:06	0,01	1,49	2,99	43	0,50	3,041
00:12:14	0,01	1,51	2,87	44	0,50	3,000
00:12:22	0,01	1,52	2,75	44	0,50	2,958
00:12:30	0,01	1,54	2,64	44	0,51	2,914
00:12:39	0,01	1,56	2,52	44	0,51	2,868
00:12:47	0,01	1,58	2,41	44	0,51	2,821
00:12:55	0,01	1,60	2,31	45	0,51	2,774
00:13:03	0,01	1,61	2,20	45	0,52	2,725
00:13:12	0,01	1,63	2,10	45	0,52	2,676
00:13:20	0,01	1,65	2,01	45	0,52	2,626
00:13:28	0,01	1,67	1,91	46	0,52	2,571
00:13:36	0,01	1,68	1,83	46	0,52	2,515
00:13:44	0,00	1,70	1,74	46	0,53	2,457
00:13:52	0,00	1,72	1,66	46	0,53	2,398
00:14:00	0,00	1,74	1,58	47	0,53	2,337
00:14:08	0,00	1,76	1,50	47	0,53	2,274
00:14:16	0,00	1,77	1,42	47	0,53	2,210
00:14:25	0,00	1,79	1,35	47	0,54	2,145
00:14:33	0,00	1,81	1,27	48	0,54	2,077
00:14:42	0,00	1,83	1,20	48	0,54	2,007
00:14:51	0,00	1,85	1,12	48	0,54	1,935
00:15:00	0,00	1,87	1,05	48	0,54	1,861
00:15:10	0,00	1,90	0,98	49	0,55	1,784
00:15:15	0,00	1,91	0,95	49	0,55	1,744
00:15:20	0,00	1,92	0,91	49	0,55	1,704
00:15:26	0,00	1,93	0,87	49	0,55	1,663

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:15:31	0,00	1,94	0,84	49	0,55	1,621
00:15:37	0,00	1,96	0,81	50	0,55	1,579
00:15:43	0,00	1,97	0,77	50	0,55	1,536
00:15:49	0,00	1,99	0,74	50	0,56	1,493
00:15:55	0,00	2,00	0,70	50	0,56	1,449
00:16:01	0,00	2,01	0,67	50	0,56	1,405
00:16:08	0,00	2,03	0,64	51	0,56	1,363
00:16:13	0,00	2,04	0,61	51	0,56	1,325
00:16:21	0,00	2,06	0,58	51	0,56	1,273
00:16:29	0,00	2,08	0,55	51	0,56	1,222
00:16:35	0,00	2,09	0,53	51	0,57	1,191
00:16:40	0,00	2,11	0,51	52	0,57	1,159
00:16:49	0,00	2,13	0,47	52	0,57	1,107
00:16:57	0,00	2,15	0,45	52	0,57	1,060
00:17:07	0,00	2,17	0,42	52	0,57	1,006
00:17:16	0,00	2,19	0,39	53	0,58	0,958
00:17:24	0,00	2,21	0,37	53	0,58	0,916
00:17:24	Room 'Part II' is now filled with smoke					
00:17:33	0,00	2,23	0,34	53	0,58	0,869
00:17:43	0,00	2,26	0,32	54	0,58	0,825
00:17:51	0,00	2,28	0,31	54	0,58	0,786
00:18:00	0,00	2,30	0,29	54	0,59	0,744
00:18:09	0,00	2,32	0,27	54	0,59	0,705
00:18:18	0,00	2,34	0,25	55	0,59	0,670
00:18:27	0,00	2,36	0,24	55	0,59	0,632
00:18:36	0,00	2,38	0,23	55	0,59	0,597
00:18:45	0,00	2,40	0,21	56	0,60	0,565
00:18:54	0,00	2,43	0,20	56	0,60	0,531
00:19:03	0,00	2,45	0,19	56	0,60	0,499
00:19:12	0,00	2,47	0,18	56	0,60	0,469
00:19:21	0,00	2,49	0,17	57	0,60	0,439
00:19:30	0,00	2,51	0,16	57	0,61	0,410
00:19:38	0,00	2,53	0,15	57	0,61	0,383
00:19:47	0,00	2,55	0,14	58	0,61	0,355
00:19:56	0,00	2,58	0,14	58	0,61	0,328
00:20:05	0,00	2,60	0,13	58	0,61	0,303
00:20:14	0,00	2,62	0,12	58	0,62	0,278
00:20:23	0,00	2,64	0,12	59	0,62	0,253
00:20:31	0,00	2,66	0,11	59	0,62	0,230
00:20:40	0,00	2,68	0,10	59	0,62	0,207
00:20:49	0,00	2,70	0,10	59	0,62	0,184
00:20:58	0,00	2,72	0,09	60	0,63	0,163
00:21:06	0,00	2,75	0,09	60	0,63	0,142
00:21:15	0,00	2,77	0,09	60	0,63	0,121
00:21:24	0,00	2,79	0,08	61	0,63	0,101
00:21:33	0,00	2,81	0,08	61	0,63	0,082
00:21:42	0,00	2,83	0,07	61	0,64	0,063
00:21:50	0,00	2,85	0,07	61	0,64	0,045
00:21:59	0,00	2,87	0,07	62	0,64	0,028
00:22:08	0,00	2,89	0,06	62	0,64	0,011
00:22:16	0,00	2,91	0,06	62	0,65	-0,002
00:22:25	0,00	2,93	0,06	62	0,65	-0,016
00:22:34	0,00	2,96	0,05	63	0,65	-0,031
00:22:42	0,00	2,98	0,05	63	0,65	-0,046
00:22:51	0,00	3,00	0,05	63	0,65	-0,060
00:23:00	0,00	3,02	0,05	64	0,66	-0,075

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:08	0,00	3,04	0,05	64	0,66	-0,089
00:23:17	0,00	3,06	0,04	64	0,66	-0,103
00:23:26	0,00	3,08	0,04	64	0,66	-0,117
00:23:34	0,00	3,10	0,04	65	0,66	-0,131
00:23:43	0,00	3,12	0,04	65	0,67	-0,145
00:23:52	0,00	3,14	0,04	65	0,67	-0,158
00:24:00	0,00	3,16	0,04	65	0,67	-0,172
00:24:09	0,00	3,18	0,03	66	0,67	-0,185
00:24:18	0,00	3,20	0,03	66	0,67	-0,198
00:24:26	0,00	3,22	0,03	66	0,68	-0,211
00:24:35	0,00	3,24	0,03	66	0,68	-0,223
00:24:43	0,00	3,27	0,03	67	0,68	-0,236
00:24:52	0,00	3,29	0,03	67	0,68	-0,248
00:25:00	0,00	3,31	0,03	67	0,69	-0,261
00:25:09	0,00	3,33	0,02	67	0,69	-0,273
00:25:17	0,00	3,35	0,02	68	0,69	-0,285
00:25:26	0,00	3,37	0,02	68	0,69	-0,297
00:25:35	0,00	3,39	0,02	68	0,69	-0,309
00:25:43	0,00	3,41	0,02	69	0,70	-0,321
00:25:52	0,00	3,43	0,02	69	0,70	-0,332
00:26:00	0,00	3,45	0,02	69	0,70	-0,344
00:26:09	0,00	3,47	0,02	69	0,70	-0,355
00:26:17	0,00	3,49	0,02	70	0,70	-0,367
00:26:26	0,00	3,51	0,02	70	0,71	-0,378
00:26:34	0,00	3,53	0,02	70	0,71	-0,389
00:26:43	0,00	3,55	0,01	70	0,71	-0,400
00:26:51	0,00	3,57	0,01	71	0,71	-0,411
00:27:00	0,00	3,59	0,01	71	0,71	-0,422
00:27:08	0,00	3,61	0,01	71	0,72	-0,433
00:27:16	0,00	3,63	0,01	71	0,72	-0,444
00:27:25	0,00	3,65	0,01	72	0,72	-0,455
00:27:33	0,00	3,67	0,01	72	0,72	-0,465
00:27:42	0,00	3,69	0,01	72	0,73	-0,476
00:27:50	0,00	3,71	0,01	72	0,73	-0,487
00:27:58	0,00	3,73	0,01	73	0,73	-0,497
00:28:07	0,00	3,75	0,01	73	0,73	-0,507
00:28:15	0,00	3,77	0,01	73	0,73	-0,518
00:28:24	0,00	3,79	0,01	73	0,74	-0,528
00:28:32	0,00	3,81	0,01	74	0,74	-0,538
00:28:40	0,00	3,83	0,01	74	0,74	-0,548
00:28:49	0,00	3,84	0,01	74	0,74	-0,558
00:28:57	0,00	3,86	0,01	74	0,74	-0,568
00:29:05	0,00	3,88	0,01	75	0,75	-0,578
00:29:14	0,00	3,90	0,01	75	0,75	-0,588
00:29:22	0,00	3,92	0,01	75	0,75	-0,598
00:29:30	0,00	3,94	0,01	75	0,75	-0,608
00:29:39	0,00	3,96		76	0,76	-0,618
00:29:47	0,00	3,98		76	0,76	-0,627
00:29:55	0,00	4,00		76	0,76	-0,637
00:30:04	0,00	4,02		76	0,76	-0,647
00:30:12	0,00	4,04		77	0,76	-0,656
00:30:20	0,00	4,06		77	0,77	-0,666
00:30:29	0,00	4,08		77	0,77	-0,675
00:30:37	0,00	4,10		77	0,77	-0,685
00:30:45	0,00	4,12		78	0,77	-0,694
00:30:53	0,00	4,13		78	0,77	-0,703

Part I

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:31:02	0,00	4,15		78	0,78	-0,713
00:31:10	0,00	4,17		78	0,78	-0,722
00:31:18	0,00	4,19		79	0,78	-0,731
00:31:26	0,00	4,21		79	0,78	-0,740
00:31:35	0,00	4,23		79	0,79	-0,749
00:31:43	0,00	4,25		79	0,79	-0,759
00:31:47	0,00	4,26		79	0,79	-0,765
00:31:47	Room 'Part I' is now filled with smoke					
00:31:55	0,00	4,28		80	0,79	-0,774
00:32:03	0,00	4,30		80	0,79	-0,782
00:32:12	0,00	4,32		80	0,80	-0,791
00:32:20	0,00	4,33		80	0,80	-0,799
00:32:28	0,00	4,35		81	0,80	-0,808
00:32:36	0,00	4,37		81	0,80	-0,817
00:32:44	0,00	4,39		81	0,80	-0,825
00:32:52	0,00	4,41		81	0,81	-0,833
00:33:01	0,00	4,43		82	0,81	-0,842
00:33:09	0,00	4,45		82	0,81	-0,850
00:33:17	0,00	4,47		82	0,81	-0,859
00:33:25	0,00	4,48		82	0,81	-0,867
00:33:33	0,00	4,50		83	0,82	-0,875
00:33:41	0,00	4,52		83	0,82	-0,884
00:33:49	0,00	4,54		83	0,82	-0,892
00:33:57	0,00	4,56		83	0,82	-0,900
00:34:06	0,00	4,58		83	0,83	-0,908
00:34:14	0,00	4,60		84	0,83	-0,917
00:34:22	0,00	4,61		84	0,83	-0,925
00:34:30	0,00	4,63		84	0,83	-0,933
00:34:38	0,00	4,65		84	0,83	-0,941
00:34:46	0,00	4,67		85	0,84	-0,949
00:34:54	0,00	4,69		85	0,84	-0,957
00:35:02	0,00	4,71		85	0,84	-0,965
00:35:10	0,00	4,72		85	0,84	-0,973
00:35:18	0,00	4,74		86	0,85	-0,981
00:35:26	0,00	4,76		86	0,85	-0,989
00:35:34	0,00	4,78		86	0,85	-0,997
00:35:42	0,00	4,80		86	0,85	-1,005
00:35:50	0,00	4,82		87	0,85	-1,013
00:35:58	0,00	4,83		87	0,86	-1,021
00:36:06	0,00	4,85		87	0,86	-1,028
00:36:14	0,00	4,87		87	0,86	-1,036
00:36:22	0,00	4,89		87	0,86	-1,044
00:36:30	0,00	4,91		88	0,86	-1,052
00:36:38	0,00	4,92		88	0,87	-1,060
00:36:46	0,00	4,94		88	0,87	-1,067
00:36:54	0,00	4,96		88	0,87	-1,075
00:37:02	0,00	4,98		89	0,87	-1,083
00:37:10	0,00	5,00		89	0,88	-1,090
00:37:18	0,00	5,01		89	0,88	-1,098
00:37:26	0,00	5,03		89	0,88	-1,105
00:37:34	0,00	5,05		89	0,88	-1,113
00:37:42	0,00	5,07		90	0,88	-1,120
00:37:50	0,00	5,09		90	0,89	-1,128
00:37:58	0,00	5,10		90	0,89	-1,135
00:38:06	0,00	5,12		90	0,89	-1,143
00:38:14	0,00	5,14		91	0,89	-1,150

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:38:22	0,00	5,16		91	0,90	-1,158
00:38:29	0,00	5,17		91	0,90	-1,165
00:38:37	0,00	5,19		91	0,90	-1,172
00:38:45	0,00	5,21		92	0,90	-1,180
00:38:53	0,00	5,23		92	0,90	-1,187
00:39:01	0,00	5,25		92	0,91	-1,194
00:39:09	0,00	5,26		92	0,91	-1,202
00:39:17	0,00	5,28		92	0,91	-1,209
00:39:25	0,00	5,30		93	0,91	-1,216
00:39:32	0,00	5,32		93	0,92	-1,223
00:39:40	0,00	5,33		93	0,92	-1,230
00:39:48	0,00	5,35		93	0,92	-1,237
00:39:56	0,00	5,37		94	0,92	-1,245
00:40:00	0,00	5,38		94	0,92	-1,248
00:40:00	Fire brigade is alarmed					
00:40:07	0,00	5,39		94	0,93	-1,255
00:40:15	0,00	5,41		94	0,93	-1,262
00:40:23	0,00	5,43		94	0,93	-1,269
00:40:31	0,00	5,45		95	0,93	-1,276
00:40:39	0,00	5,46		95	0,93	-1,283
00:40:46	0,00	5,48		95	0,94	-1,290
00:40:54	0,00	5,50		95	0,94	-1,296
00:41:02	0,00	5,51		95	0,94	-1,303
00:41:10	0,00	5,53		96	0,94	-1,310
00:41:18	0,00	5,55		96	0,95	-1,317
00:41:25	0,00	5,57		96	0,95	-1,324
00:41:33	0,00	5,58		96	0,95	-1,330
00:41:41	0,00	5,60		96	0,95	-1,337
00:41:49	0,00	5,62		97	0,95	-1,344
00:41:56	0,00	5,63		97	0,96	-1,350
00:42:04	0,00	5,65		97	0,96	-1,357
00:42:12	0,00	5,67		97	0,96	-1,363
00:42:20	0,00	5,69		98	0,96	-1,369
00:42:27	0,00	5,70		98	0,97	-1,375
00:42:35	0,00	5,72		98	0,97	-1,382
00:42:43	0,00	5,74		98	0,97	-1,388
00:42:50	0,00	5,75		98	0,97	-1,394
00:42:58	0,00	5,77		99	0,97	-1,400
00:43:06	0,00	5,79		99	0,98	-1,406
00:43:14	0,00	5,80		99	0,98	-1,412
00:43:21	0,00	5,82		99	0,98	-1,418
00:43:29	0,00	5,84		99	0,98	-1,424
00:43:37	0,00	5,86		100	0,99	-1,430
00:43:44	0,00	5,87		100	0,99	-1,436
00:43:52	0,00	5,89		100	0,99	-1,442
00:44:00	0,00	5,91		100	0,99	-1,448
00:44:07	0,00	5,92		101	1,00	-1,454
00:44:15	0,00	5,94		101	1,00	-1,460
00:44:23	0,00	5,96		101	1,00	-1,465
00:44:30	0,00	5,97		101	1,00	-1,471
00:44:38	0,00	5,99		101	1,00	-1,477
00:44:46	0,00	6,01		102	1,01	-1,483
00:44:53	0,00	6,02		102	1,01	-1,489
00:45:01	0,00	6,04		102	1,01	-1,495
00:45:08	0,00	6,06		102	1,01	-1,500
00:45:16	0,00	6,07		102	1,02	-1,506

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:45:24	0,00	6,09		103	1,02	-1,512
00:45:31	0,00	6,11		103	1,02	-1,518
00:45:39	0,00	6,12		103	1,02	-1,523
00:45:46	0,00	6,14		103	1,02	-1,529
00:45:54	0,00	6,15		103	1,03	-1,535
00:46:02	0,00	6,17		104	1,03	-1,540
00:46:09	0,00	6,19		104	1,03	-1,546
00:46:17	0,00	6,20		104	1,03	-1,552
00:46:24	0,00	6,22		104	1,04	-1,557
00:46:32	0,00	6,24		105	1,04	-1,563
00:46:39	0,00	6,25		105	1,04	-1,568
00:46:47	0,00	6,27		105	1,04	-1,574
00:46:54	0,00	6,29		105	1,05	-1,580
00:47:02	0,00	6,30		105	1,05	-1,585
00:47:10	0,00	6,32		106	1,05	-1,591
00:47:17	0,00	6,33		106	1,05	-1,596
00:47:25	0,00	6,35		106	1,05	-1,602
00:47:32	0,00	6,37		106	1,06	-1,607
00:47:40	0,00	6,38		106	1,06	-1,613
00:47:47	0,00	6,40		107	1,06	-1,618
00:47:55	0,00	6,42		107	1,06	-1,624
00:48:02	0,00	6,43		107	1,07	-1,629
00:48:10	0,00	6,45		107	1,07	-1,635
00:48:17	0,00	6,46		107	1,07	-1,640
00:48:25	0,00	6,48		108	1,07	-1,646
00:48:32	0,00	6,50		108	1,07	-1,651
00:48:40	0,00	6,51		108	1,08	-1,656
00:48:47	0,00	6,53		108	1,08	-1,662
00:48:55	0,00	6,54		108	1,08	-1,667
00:49:02	0,00	6,56		109	1,08	-1,673
00:49:10	0,00	6,58		109	1,09	-1,678
00:49:17	0,00	6,59		109	1,09	-1,683
00:49:24	0,00	6,61		109	1,09	-1,689
00:49:32	0,00	6,62		109	1,09	-1,694
00:49:39	0,00	6,64		110	1,10	-1,699
00:49:47	0,00	6,66		110	1,10	-1,705
00:49:54	0,00	6,67		110	1,10	-1,710
00:50:02	0,00	6,69		110	1,10	-1,715
00:50:09	0,00	6,70		110	1,10	-1,720
00:50:16	0,00	6,72		111	1,11	-1,726
00:50:24	0,00	6,73		111	1,11	-1,731
00:50:31	0,00	6,75		111	1,11	-1,736
00:50:39	0,00	6,77		111	1,11	-1,741
00:50:46	0,00	6,78		111	1,12	-1,747
00:50:54	0,00	6,80		112	1,12	-1,752
00:51:01	0,00	6,81		112	1,12	-1,757
00:51:08	0,00	6,83		112	1,12	-1,762
00:51:16	0,00	6,84		112	1,13	-1,768
00:51:23	0,00	6,86		112	1,13	-1,773
00:51:30	0,00	6,88		113	1,13	-1,778
00:51:38	0,00	6,89		113	1,13	-1,783
00:51:45	0,00	6,91		113	1,13	-1,788
00:51:52	0,00	6,92		113	1,14	-1,793
00:52:00	0,00	6,94		113	1,14	-1,798
00:52:07	0,00	6,95		114	1,14	-1,804
00:52:14	0,00	6,97		114	1,14	-1,809

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:52:22	0,00	6,98		114	1,15	-1,814
00:52:29	0,00	7,00		114	1,15	-1,819
00:52:37	0,00	7,02		114	1,15	-1,824
00:52:44	0,00	7,03		115	1,15	-1,829
00:52:51	0,00	7,05		115	1,16	-1,834
00:52:58	0,00	7,06		115	1,16	-1,839
00:53:06	0,00	7,08		115	1,16	-1,844
00:53:13	0,00	7,09		115	1,16	-1,849
00:53:20	0,00	7,11		116	1,16	-1,854
00:53:28	0,00	7,12		116	1,17	-1,859
00:53:35	0,00	7,14		116	1,17	-1,864
00:53:42	0,00	7,15		116	1,17	-1,869
00:53:50	0,00	7,17		116	1,17	-1,874
00:53:57	0,00	7,18		116	1,18	-1,879
00:54:04	0,00	7,20		117	1,18	-1,884
00:54:11	0,00	7,21		117	1,18	-1,889
00:54:19	0,00	7,23		117	1,18	-1,894
00:54:26	0,00	7,24		117	1,19	-1,899
00:54:33	0,00	7,26		117	1,19	-1,904
00:54:41	0,00	7,27		118	1,19	-1,909
00:54:48	0,00	7,29		118	1,19	-1,914
00:54:55	0,00	7,30		118	1,19	-1,919
00:55:00	0,00	7,31		118	1,20	-1,924
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:07	0,00	7,33		118	1,20	-1,927
00:55:14	0,00	7,34		118	1,20	-1,932
00:55:21	0,00	7,36		119	1,20	-1,937
00:55:28	0,00	7,37		119	1,21	-1,942
00:55:36	0,00	7,39		119	1,21	-1,947
00:55:43	0,00	7,40		119	1,21	-1,951
00:55:50	0,00	7,42		119	1,21	-1,956
00:56:00	0,00	7,44		120	1,22	-1,964
00:56:00	Fire brigade ready, extinguishing started					
00:56:07	0,00	7,45		120	1,22	-1,968
00:56:14	0,00	7,47		120	1,22	-1,972
00:56:21	0,00	7,48		120	1,22	-1,977
00:56:30	0,00	7,50		120	1,22	-1,984
00:56:31	0,00	7,50		120	1,23	-2,034
00:56:31	Fire is declining					
00:56:41	0,00	7,52		121	1,23	-2,290
00:56:50	0,00	7,54		121	1,23	-2,528
00:57:00	0,00	7,56		121	1,23	-2,752
00:57:09	0,00	7,57		121	1,23	-2,964
00:57:19	0,00	7,59		121	1,23	-3,165
00:57:28	0,00	7,60		121	1,23	-3,357
00:57:38	0,00	7,61		121	1,23	-3,540
00:57:47	0,00	7,62		121	1,23	-3,716
00:57:57	0,00	7,63		121	1,23	-3,885
00:58:06	0,00	7,64		121	1,23	-4,048
00:58:16	0,00	7,65		120	1,22	-4,206
00:58:25	0,00	7,65		120	1,22	-4,359
00:58:35	0,00	7,66		120	1,22	-4,508
00:58:45	0,00	7,66		120	1,21	-4,651
00:58:54	0,00	7,65		119	1,21	-4,761
00:59:04	0,00	7,65		119	1,20	-4,877
00:59:13	0,00	7,64		118	1,20	-4,999

Part I

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:59:15	0,00	7,64		118	1,20	-5,021
00:59:15	Fire has been put out					

Part II

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:00:00	0,00		24,00	20		-0,005
00:00:09	0,00		24,00	20		0,000
00:00:19	0,00		24,00	20		0,000
00:00:28	0,00		24,00	20		0,000
00:00:38	0,00		24,00	20		0,000
00:00:48	0,00		24,00	20		0,000
00:00:58	0,00		24,00	20		0,000
00:01:07	0,00		24,00	20		0,000
00:01:17	0,00		24,00	20		0,000
00:01:27	0,00		24,00	20		0,000
00:01:36	0,00		24,00	20		0,000
00:01:45	0,00		24,00	20		0,000
00:01:55	0,00		24,00	20		0,083
00:02:05	0,00		24,00	20		0,115
00:02:14	0,00		24,00	20		0,154
00:02:24	0,00		24,00	20		0,199
00:02:33	0,00		24,00	20		0,258
00:02:43	0,00		24,00	20		0,325
00:02:53	0,00		24,00	20		0,409
00:03:02	0,00		24,00	20		0,505
00:03:12	0,00		24,00	20		0,614
00:03:22	0,00		24,00	20		0,712
00:03:31	0,00		24,00	20		0,768
00:03:41	0,01		24,00	20		0,805
00:03:51	0,01	0,23	23,34	23		1,205
00:04:01	0,01	0,25	22,49	24	0,12	1,408
00:04:10	0,01	0,26	21,50	24	0,13	1,641
00:04:20	0,01	0,28	20,45	24	0,14	1,902
00:04:30	0,01	0,30	19,41	24	0,15	2,187
00:04:40	0,01	0,32	18,43	25	0,16	2,495
00:04:49	0,01	0,33	17,52	25	0,17	2,839
00:04:59	0,01	0,35	16,70	25	0,18	3,224
00:05:09	0,01	0,37	15,92	25	0,19	3,644
00:05:18	0,01	0,38	15,17	26	0,20	4,094
00:05:28	0,01	0,40	14,42	26	0,21	4,605
00:05:38	0,01	0,42	13,69	26	0,22	5,152
00:05:48	0,01	0,45	12,97	27	0,24	5,272
00:05:58	0,01	0,47	12,32	27	0,25	5,134
00:06:07	0,01	0,50	11,71	27	0,26	5,007
00:06:16	0,01	0,52	11,21	28	0,27	4,904
00:06:24	0,01	0,54	10,71	28	0,28	4,804
00:06:34	0,01	0,57	10,22	29	0,29	4,705
00:06:44	0,01	0,59	9,73	29	0,30	4,608
00:06:52	0,01	0,61	9,34	29	0,31	4,532
00:07:00	0,01	0,64	8,95	30	0,31	4,458
00:07:09	0,01	0,66	8,57	30	0,32	4,385
00:07:18	0,01	0,68	8,19	30	0,33	4,313
00:07:28	0,01	0,71	7,81	31	0,34	4,244
00:07:38	0,01	0,73	7,44	31	0,35	4,176
00:07:46	0,01	0,75	7,16	31	0,36	4,126
00:07:53	0,01	0,77	6,89	32	0,36	4,077
00:08:02	0,01	0,79	6,61	32	0,37	4,028
00:08:10	0,01	0,81	6,34	32	0,37	3,981
00:08:18	0,01	0,83	6,07	32	0,38	3,934
00:08:27	0,01	0,85	5,81	33	0,39	3,888
00:08:36	0,01	0,87	5,54	33	0,39	3,843

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:46	0,01	0,90	5,28	33	0,40	3,799
00:08:55	0,01	0,92	5,02	34	0,41	3,755
00:09:05	0,01	0,94	4,77	34	0,41	3,712
00:09:12	0,01	0,96	4,59	34	0,42	3,684
00:09:19	0,01	0,97	4,43	34	0,42	3,656
00:09:26	0,01	0,99	4,26	35	0,42	3,628
00:09:33	0,01	1,01	4,09	35	0,43	3,601
00:09:40	0,01	1,02	3,92	35	0,43	3,573
00:09:40	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:09:48	0,01	1,04	3,76	35	0,43	3,546
00:09:55	0,01	1,06	3,59	36	0,44	3,520
00:10:03	0,01	1,07	3,43	36	0,44	3,493
00:10:11	0,01	1,09	3,27	36	0,45	3,467
00:10:11	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:10:19	0,01	1,11	3,11	36	0,45	3,441
00:10:27	0,01	1,13	2,95	37	0,45	3,416
00:10:35	0,01	1,15	2,79	37	0,46	3,390
00:10:44	0,01	1,17	2,63	37	0,46	3,365
00:10:52	0,01	1,19	2,48	37	0,46	3,340
00:11:01	0,01	1,21	2,33	38	0,46	3,316
00:11:10	0,01	1,22	2,17	38	0,47	3,292
00:11:19	0,01	1,24	2,02	38	0,47	3,268
00:11:28	0,01	1,26	1,89	38	0,47	3,240
00:11:35	0,01	1,28	1,78	39	0,48	3,214
00:11:42	0,01	1,30	1,67	39	0,48	3,185
00:11:50	0,01	1,31	1,56	39	0,48	3,153
00:11:58	0,01	1,33	1,45	39	0,48	3,119
00:12:06	0,01	1,35	1,34	40	0,48	3,084
00:12:14	0,01	1,37	1,24	40	0,49	3,048
00:12:22	0,00	1,38	1,14	40	0,49	3,011
00:12:30	0,00	1,40	1,04	40	0,49	2,973
00:12:39	0,00	1,42	0,95	41	0,49	2,935
00:12:47	0,00	1,44	0,86	41	0,49	2,897
00:12:55	0,00	1,46	0,78	41	0,50	2,859
00:13:03	0,00	1,47	0,70	41	0,50	2,821
00:13:12	0,00	1,49	0,63	42	0,50	2,785
00:13:20	0,00	1,51	0,56	42	0,50	2,751
00:13:28	0,00	1,53	0,49	42	0,50	2,712
00:13:36	0,00	1,55	0,43	42	0,50	2,674
00:13:44	0,00	1,56	0,38	43	0,51	2,636
00:13:52	0,00	1,58	0,33	43	0,51	2,598
00:14:00	0,00	1,60	0,28	43	0,51	2,562
00:14:08	0,00	1,62	0,24	43	0,51	2,526
00:14:16	0,00	1,64	0,20	43	0,51	2,492
00:14:25	0,00	1,65	0,17	44	0,51	2,459
00:14:33	0,00	1,67	0,14	44	0,52	2,427
00:14:42	0,00	1,69	0,11	44	0,52	2,396
00:14:51	0,00	1,71	0,09	44	0,52	2,366
00:15:00	0,00	1,73	0,07	45	0,52	2,336
00:15:10	0,00	1,76	0,05	45	0,52	2,308
00:15:15	0,00	1,77	0,05	45	0,52	2,293
00:15:20	0,00	1,78	0,04	45	0,53	2,279
00:15:26	0,00	1,79	0,03	46	0,53	2,265
00:15:31	0,00	1,81	0,03	46	0,53	2,250
00:15:37	0,00	1,82	0,02	46	0,53	2,236
00:15:43	0,00	1,83	0,02	46	0,53	2,221

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:15:49	0,00	1,85	0,02	46	0,53	2,206
00:15:55	0,00	1,86	0,01	46	0,53	2,191
00:16:01	0,00	1,88	0,01	47	0,53	2,176
00:16:08	0,00	1,89	0,01	47	0,53	2,161
00:16:13	0,00	1,90	0,01	47	0,54	2,148
00:16:21	0,00	1,92	0,01	47	0,54	2,129
00:16:29	0,00	1,94		47	0,54	2,110
00:16:35	0,00	1,95		48	0,54	2,098
00:16:40	0,00	1,97		48	0,54	2,085
00:16:49	0,00	1,99		48	0,54	2,064
00:16:57	0,00	2,01		48	0,54	2,045
00:17:07	0,00	2,03		49	0,55	2,022
00:17:16	0,00	2,05		49	0,55	1,999
00:17:24	0,00	2,07		49	0,55	1,980
00:17:24	Room 'Part II' is now filled with smoke					
00:17:33	0,00	2,09		49	0,55	1,958
00:17:43	0,00	2,11		50	0,55	1,936
00:17:51	0,00	2,13		50	0,56	1,917
00:18:00	0,00	2,16		50	0,56	1,896
00:18:09	0,00	2,18		51	0,56	1,875
00:18:18	0,00	2,20		51	0,56	1,856
00:18:27	0,00	2,22		51	0,56	1,835
00:18:36	0,00	2,24		51	0,57	1,813
00:18:45	0,00	2,26		52	0,57	1,794
00:18:54	0,00	2,29		52	0,57	1,774
00:19:03	0,00	2,31		52	0,57	1,754
00:19:12	0,00	2,33		52	0,57	1,737
00:19:21	0,00	2,35		53	0,58	1,718
00:19:30	0,00	2,37		53	0,58	1,699
00:19:38	0,00	2,39		53	0,58	1,680
00:19:47	0,00	2,42		54	0,58	1,661
00:19:56	0,00	2,44		54	0,58	1,643
00:20:05	0,00	2,46		54	0,59	1,625
00:20:14	0,00	2,48		54	0,59	1,609
00:20:23	0,00	2,50		55	0,59	1,592
00:20:31	0,00	2,52		55	0,59	1,575
00:20:40	0,00	2,54		55	0,59	1,557
00:20:49	0,00	2,57		55	0,60	1,540
00:20:58	0,00	2,59		56	0,60	1,524
00:21:06	0,00	2,61		56	0,60	1,508
00:21:15	0,00	2,63		56	0,60	1,492
00:21:24	0,00	2,65		57	0,60	1,478
00:21:33	0,00	2,67		57	0,61	1,463
00:21:42	0,00	2,69		57	0,61	1,448
00:21:50	0,00	2,71		57	0,61	1,433
00:21:59	0,00	2,74		58	0,61	1,419
00:22:08	0,00	2,76		58	0,61	1,406
00:22:16	0,00	2,78		58	0,61	1,396
00:22:25	0,00	2,80		58	0,62	1,386
00:22:34	0,00	2,82		59	0,62	1,374
00:22:42	0,00	2,84		59	0,62	1,361
00:22:51	0,00	2,86		59	0,62	1,349
00:23:00	0,00	2,88		60	0,62	1,335
00:23:08	0,00	2,90		60	0,63	1,323
00:23:17	0,00	2,93		60	0,63	1,310
00:23:26	0,00	2,95		60	0,63	1,298

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:34	0,00	2,97		61	0,63	1,286
00:23:43	0,00	2,99		61	0,63	1,275
00:23:52	0,00	3,01		61	0,64	1,263
00:24:00	0,00	3,03		61	0,64	1,251
00:24:09	0,00	3,05		62	0,64	1,239
00:24:18	0,00	3,07		62	0,64	1,226
00:24:26	0,00	3,09		62	0,64	1,214
00:24:35	0,00	3,11		62	0,65	1,203
00:24:43	0,00	3,13		63	0,65	1,191
00:24:52	0,00	3,15		63	0,65	1,179
00:25:00	0,00	3,17		63	0,65	1,169
00:25:09	0,00	3,20		63	0,65	1,158
00:25:17	0,00	3,22		64	0,66	1,146
00:25:26	0,00	3,24		64	0,66	1,135
00:25:35	0,00	3,26		64	0,66	1,124
00:25:43	0,00	3,28		64	0,66	1,111
00:25:52	0,00	3,30		65	0,66	1,100
00:26:00	0,00	3,32		65	0,67	1,088
00:26:09	0,00	3,34		65	0,67	1,077
00:26:17	0,00	3,36		65	0,67	1,066
00:26:26	0,00	3,38		66	0,67	1,055
00:26:34	0,00	3,40		66	0,67	1,046
00:26:43	0,00	3,42		66	0,68	1,035
00:26:51	0,00	3,44		66	0,68	1,024
00:27:00	0,00	3,46		67	0,68	1,013
00:27:08	0,00	3,48		67	0,68	1,002
00:27:16	0,00	3,50		67	0,68	0,991
00:27:25	0,00	3,52		67	0,69	0,979
00:27:33	0,00	3,54		68	0,69	0,968
00:27:42	0,00	3,56		68	0,69	0,958
00:27:50	0,00	3,58		68	0,69	0,947
00:27:58	0,00	3,60		68	0,70	0,937
00:28:07	0,00	3,62		69	0,70	0,926
00:28:15	0,00	3,64		69	0,70	0,916
00:28:24	0,00	3,66		69	0,70	0,905
00:28:32	0,00	3,68		69	0,70	0,897
00:28:40	0,00	3,70		70	0,71	0,886
00:28:49	0,00	3,72		70	0,71	0,876
00:28:57	0,00	3,74		70	0,71	0,865
00:29:05	0,00	3,76		70	0,71	0,855
00:29:14	0,00	3,78		71	0,71	0,845
00:29:22	0,00	3,80		71	0,72	0,835
00:29:30	0,00	3,82		71	0,72	0,825
00:29:39	0,00	3,84		71	0,72	0,815
00:29:47	0,00	3,86		72	0,72	0,804
00:29:55	0,00	3,88		72	0,72	0,793
00:30:04	0,00	3,90		72	0,73	0,783
00:30:12	0,00	3,92		72	0,73	0,773
00:30:20	0,00	3,94		73	0,73	0,763
00:30:29	0,00	3,96		73	0,73	0,753
00:30:37	0,00	3,98		73	0,73	0,743
00:30:45	0,00	3,99		73	0,74	0,733
00:30:53	0,00	4,01		74	0,74	0,723
00:31:02	0,00	4,03		74	0,74	0,713
00:31:10	0,00	4,05		74	0,74	0,703
00:31:18	0,00	4,07		74	0,74	0,694

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:31:26	0,00	4,09		75	0,75	0,684
00:31:35	0,00	4,11		75	0,75	0,674
00:31:43	0,00	4,13		75	0,75	0,665
00:31:47	0,00	4,14		75	0,75	0,662
00:31:47	Room 'Part I' is now filled with smoke					
00:31:55	0,00	4,16		75	0,75	0,652
00:32:03	0,00	4,18		76	0,76	0,643
00:32:12	0,00	4,20		76	0,76	0,633
00:32:20	0,00	4,22		76	0,76	0,624
00:32:28	0,00	4,24		76	0,76	0,614
00:32:36	0,00	4,25		77	0,76	0,605
00:32:44	0,00	4,27		77	0,77	0,595
00:32:52	0,00	4,29		77	0,77	0,586
00:33:01	0,00	4,31		77	0,77	0,577
00:33:09	0,00	4,33		78	0,77	0,567
00:33:17	0,00	4,35		78	0,77	0,558
00:33:25	0,00	4,37		78	0,78	0,549
00:33:33	0,00	4,39		78	0,78	0,540
00:33:41	0,00	4,41		78	0,78	0,530
00:33:49	0,00	4,43		79	0,78	0,521
00:33:57	0,00	4,44		79	0,78	0,512
00:34:06	0,00	4,46		79	0,79	0,503
00:34:14	0,00	4,48		79	0,79	0,494
00:34:22	0,00	4,50		80	0,79	0,485
00:34:30	0,00	4,52		80	0,79	0,476
00:34:38	0,00	4,54		80	0,79	0,467
00:34:46	0,00	4,56		80	0,80	0,458
00:34:54	0,00	4,57		81	0,80	0,449
00:35:02	0,00	4,59		81	0,80	0,440
00:35:10	0,00	4,61		81	0,80	0,431
00:35:18	0,00	4,63		81	0,81	0,422
00:35:26	0,00	4,65		81	0,81	0,413
00:35:34	0,00	4,67		82	0,81	0,405
00:35:42	0,00	4,69		82	0,81	0,396
00:35:50	0,00	4,70		82	0,81	0,387
00:35:58	0,00	4,72		82	0,82	0,378
00:36:06	0,00	4,74		83	0,82	0,370
00:36:14	0,00	4,76		83	0,82	0,361
00:36:22	0,00	4,78		83	0,82	0,352
00:36:30	0,00	4,80		83	0,82	0,344
00:36:38	0,00	4,81		84	0,83	0,335
00:36:46	0,00	4,83		84	0,83	0,327
00:36:54	0,00	4,85		84	0,83	0,318
00:37:02	0,00	4,87		84	0,83	0,310
00:37:10	0,00	4,89		84	0,83	0,301
00:37:18	0,00	4,91		85	0,84	0,293
00:37:26	0,00	4,92		85	0,84	0,282
00:37:34	0,00	4,94		85	0,84	0,274
00:37:42	0,00	4,96		85	0,84	0,265
00:37:50	0,00	4,98		86	0,84	0,257
00:37:58	0,00	5,00		86	0,85	0,249
00:38:06	0,00	5,01		86	0,85	0,240
00:38:14	0,00	5,03		86	0,85	0,232
00:38:22	0,00	5,05		86	0,85	0,224
00:38:29	0,00	5,07		87	0,86	0,216
00:38:37	0,00	5,09		87	0,86	0,207

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:38:45	0,00	5,10		87	0,86	0,201
00:38:53	0,00	5,12		87	0,86	0,193
00:39:01	0,00	5,14		88	0,86	0,185
00:39:09	0,00	5,16		88	0,87	0,177
00:39:17	0,00	5,18		88	0,87	0,169
00:39:25	0,00	5,19		88	0,87	0,161
00:39:32	0,00	5,21		88	0,87	0,153
00:39:40	0,00	5,23		89	0,87	0,145
00:39:48	0,00	5,25		89	0,88	0,137
00:39:56	0,00	5,26		89	0,88	0,127
00:40:00	0,00	5,27		89	0,88	0,125
00:40:00	Fire brigade is alarmed					
00:40:07	0,00	5,29		89	0,88	0,118
00:40:15	0,00	5,31		90	0,88	0,110
00:40:23	0,00	5,32		90	0,89	0,102
00:40:31	0,00	5,34		90	0,89	0,095
00:40:39	0,00	5,36		90	0,89	0,087
00:40:46	0,00	5,38		91	0,89	0,077
00:40:54	0,00	5,40		91	0,89	0,069
00:41:02	0,00	5,41		91	0,90	0,061
00:41:10	0,00	5,43		91	0,90	0,054
00:41:18	0,00	5,45		91	0,90	0,046
00:41:25	0,00	5,46		92	0,90	0,039
00:41:33	0,00	5,48		92	0,91	0,034
00:41:41	0,00	5,50		92	0,91	0,026
00:41:49	0,00	5,52		92	0,91	0,019
00:41:56	0,00	5,53		92	0,91	0,011
00:42:04	0,00	5,55		93	0,91	0,004
00:42:12	0,00	5,57		93	0,92	-0,003
00:42:20	0,00	5,59		93	0,92	-0,012
00:42:27	0,00	5,60		93	0,92	-0,020
00:42:35	0,00	5,62		94	0,92	-0,026
00:42:43	0,00	5,64		94	0,92	-0,033
00:42:50	0,00	5,66		94	0,93	-0,038
00:42:58	0,00	5,67		94	0,93	-0,045
00:43:06	0,00	5,69		94	0,93	-0,051
00:43:14	0,00	5,71		95	0,93	-0,058
00:43:21	0,00	5,72		95	0,94	-0,065
00:43:29	0,00	5,74		95	0,94	-0,074
00:43:37	0,00	5,76		95	0,94	-0,081
00:43:44	0,00	5,78		95	0,94	-0,088
00:43:52	0,00	5,79		96	0,94	-0,092
00:44:00	0,00	5,81		96	0,95	-0,099
00:44:07	0,00	5,83		96	0,95	-0,105
00:44:15	0,00	5,84		96	0,95	-0,112
00:44:23	0,00	5,86		96	0,95	-0,118
00:44:30	0,00	5,88		97	0,95	-0,127
00:44:38	0,00	5,89		97	0,96	-0,134
00:44:46	0,00	5,91		97	0,96	-0,140
00:44:53	0,00	5,93		97	0,96	-0,144
00:45:01	0,00	5,94		98	0,96	-0,151
00:45:08	0,00	5,96		98	0,97	-0,157
00:45:16	0,00	5,98		98	0,97	-0,164
00:45:24	0,00	5,99		98	0,97	-0,173
00:45:31	0,00	6,01		98	0,97	-0,179
00:45:39	0,00	6,03		99	0,97	-0,186

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:45:46	0,00	6,04		99	0,98	-0,190
00:45:54	0,00	6,06		99	0,98	-0,196
00:46:02	0,00	6,08		99	0,98	-0,202
00:46:09	0,00	6,09		99	0,98	-0,208
00:46:17	0,00	6,11		100	0,98	-0,218
00:46:24	0,00	6,13		100	0,99	-0,224
00:46:32	0,00	6,14		100	0,99	-0,230
00:46:39	0,00	6,16		100	0,99	-0,234
00:46:47	0,00	6,18		100	0,99	-0,240
00:46:54	0,00	6,19		101	1,00	-0,246
00:47:02	0,00	6,21		101	1,00	-0,255
00:47:10	0,00	6,23		101	1,00	-0,261
00:47:17	0,00	6,24		101	1,00	-0,268
00:47:25	0,00	6,26		101	1,00	-0,271
00:47:32	0,00	6,28		102	1,01	-0,277
00:47:40	0,00	6,29		102	1,01	-0,283
00:47:47	0,00	6,31		102	1,01	-0,292
00:47:55	0,00	6,33		102	1,01	-0,298
00:48:02	0,00	6,34		102	1,02	-0,305
00:48:10	0,00	6,36		103	1,02	-0,308
00:48:17	0,00	6,37		103	1,02	-0,314
00:48:25	0,00	6,39		103	1,02	-0,320
00:48:32	0,00	6,41		103	1,02	-0,329
00:48:40	0,00	6,42		103	1,03	-0,335
00:48:47	0,00	6,44		104	1,03	-0,338
00:48:55	0,00	6,46		104	1,03	-0,344
00:49:02	0,00	6,47		104	1,03	-0,350
00:49:10	0,00	6,49		104	1,03	-0,356
00:49:17	0,00	6,50		104	1,04	-0,365
00:49:24	0,00	6,52		105	1,04	-0,371
00:49:32	0,00	6,54		105	1,04	-0,374
00:49:39	0,00	6,55		105	1,04	-0,380
00:49:47	0,00	6,57		105	1,05	-0,386
00:49:54	0,00	6,58		105	1,05	-0,395
00:50:02	0,00	6,60		106	1,05	-0,401
00:50:09	0,00	6,62		106	1,05	-0,404
00:50:16	0,00	6,63		106	1,05	-0,410
00:50:24	0,00	6,65		106	1,06	-0,416
00:50:31	0,00	6,66		106	1,06	-0,424
00:50:39	0,00	6,68		107	1,06	-0,430
00:50:46	0,00	6,70		107	1,06	-0,433
00:50:54	0,00	6,71		107	1,07	-0,439
00:51:01	0,00	6,73		107	1,07	-0,445
00:51:08	0,00	6,74		107	1,07	-0,453
00:51:16	0,00	6,76		108	1,07	-0,459
00:51:23	0,00	6,78		108	1,07	-0,462
00:51:30	0,00	6,79		108	1,08	-0,468
00:51:38	0,00	6,81		108	1,08	-0,474
00:51:45	0,00	6,82		108	1,08	-0,482
00:51:52	0,00	6,84		109	1,08	-0,488
00:52:00	0,00	6,85		109	1,08	-0,491
00:52:07	0,00	6,87		109	1,09	-0,497
00:52:14	0,00	6,89		109	1,09	-0,502
00:52:22	0,00	6,90		109	1,09	-0,511
00:52:29	0,00	6,92		109	1,09	-0,517
00:52:37	0,00	6,93		110	1,10	-0,520

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:52:44	0,00	6,95		110	1,10	-0,525
00:52:51	0,00	6,96		110	1,10	-0,531
00:52:58	0,00	6,98		110	1,10	-0,539
00:53:06	0,00	7,00		110	1,10	-0,542
00:53:13	0,00	7,01		111	1,11	-0,548
00:53:20	0,00	7,03		111	1,11	-0,553
00:53:28	0,00	7,04		111	1,11	-0,562
00:53:35	0,00	7,06		111	1,11	-0,568
00:53:42	0,00	7,07		111	1,12	-0,570
00:53:50	0,00	7,09		112	1,12	-0,576
00:53:57	0,00	7,10		112	1,12	-0,581
00:54:04	0,00	7,12		112	1,12	-0,590
00:54:11	0,00	7,13		112	1,12	-0,593
00:54:19	0,00	7,15		112	1,13	-0,598
00:54:26	0,00	7,16		113	1,13	-0,604
00:54:33	0,00	7,18		113	1,13	-0,612
00:54:41	0,00	7,20		113	1,13	-0,618
00:54:48	0,00	7,21		113	1,14	-0,620
00:54:55	0,00	7,23		113	1,14	-0,626
00:55:00	0,00	7,24		113	1,14	-0,634
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:07	0,00	7,25		114	1,14	-0,634
00:55:14	0,00	7,27		114	1,14	-0,643
00:55:21	0,00	7,28		114	1,15	-0,648
00:55:28	0,00	7,30		114	1,15	-0,651
00:55:36	0,00	7,31		114	1,15	-0,656
00:55:43	0,00	7,33		114	1,15	-0,665
00:55:50	0,00	7,34		115	1,15	-0,670
00:56:00	0,00	7,36		115	1,16	-0,678
00:56:00	Fire brigade ready, extinguishing started					
00:56:07	0,00	7,38		115	1,16	-0,683
00:56:14	0,00	7,39		115	1,16	-0,685
00:56:21	0,00	7,41		115	1,16	-0,690
00:56:30	0,00	7,42		116	1,17	-0,698
00:56:31	0,00	7,43		116	1,17	-0,750
00:56:31	Fire is declining					
00:56:41	0,00	7,45		116	1,17	-1,015
00:56:50	0,00	7,47		116	1,17	-1,269
00:57:00	0,00	7,49		116	1,17	-1,518
00:57:09	0,00	7,50		117	1,18	-1,761
00:57:19	0,00	7,52		117	1,18	-1,994
00:57:28	0,00	7,53		117	1,18	-2,220
00:57:38	0,00	7,55		117	1,18	-2,437
00:57:47	0,00	7,56		117	1,18	-2,651
00:57:57	0,00	7,57		117	1,18	-2,859
00:58:06	0,00	7,59		117	1,18	-3,066
00:58:16	0,00	7,60		117	1,18	-3,265
00:58:25	0,00	7,60		117	1,18	-3,458
00:58:35	0,00	7,61		117	1,18	-3,650
00:58:45	0,00	7,62		117	1,18	-3,847
00:58:54	0,00	7,62		117	1,18	-4,026
00:59:04	0,00	7,63		116	1,17	-4,203
00:59:13	0,00	7,63		116	1,17	-4,380
00:59:15	0,00	7,63		116	1,17	-4,410
00:59:15	Fire has been put out					

Calculation

Basic information

Client:	BWSC
Scenario name:	Part I
Consultant:	Rambøll
Reference no.:	
Company type:	Industry, chemical
Basic bldg. construction:	Brick-wall/concrete-roof
Last revision:	12-12-2018 14:27:23
Revision No.:	40

Calculation options

Post flash-over model enabled:	x
Time limit [min]:	60
Plumemodel:	Heskestad

Fire brigade

Fire brigade active:	–
City area:	–
24 hour:	–
Distance/fire station [km]:	10,0
Calculated response time [min]:	15
Time before manual alarm [min]:	40

Fire start

Fire start room:	Part II
Fire start, type:	Energy formula fire
Fire start, name:	5,5 MW Fast
Fire start, code:	-
Optical smoke potential [dB/m]:	100,0
Maximum Q(t) [MW]:	5,50
Parabolic growth [MW/min²]:	0,1692
Parabolic growth [kW/s²]:	0,0470
Linear growth [MW/min]:	0,0000
Constant fire [MW]:	0,0000
Initial fire [kW]:	0,00
Doubling time [min]:	0,00

Fire installations

	[--- In operation				---]	
Room name	AFV Heat	AFV Smoke	AFV Timer	Sprinkler	AFA Heat	AFA Smoke	Windload [m/s]
Part I	–	–	–	–	–	–	0,00
Part II	–	–	–	–	–	–	0,00

Events

Fire progression:
Energy formula fire > 5,5 MW Fast
Plumemodel > Heskestad
00:08:14 : Critical condition in room 'Part I': Smoke free height less than 5,20 m
00:10:31 : Critical condition in room 'Part II': Smoke free height less than 4,00 m
00:15:29 : Room 'Part I' is now filled with smoke
00:23:45 : Room 'Part II' is now filled with smoke
00:40:00 : Fire brigade is alarmed
00:55:00 : Fire brigade arrived, preparing extinguishing
00:56:00 : Fire brigade ready, extinguishing started
00:56:31 : Fire is declining
00:59:15 : Fire has been put out

RHR and smoke layer temperature in all rooms

Time	Rate of heat release [kW]	[---------- Smoke layer temp. [ºC] ----------] Part I	Part II
00:00:00	0	20	20
00:00:09	4	20	20
00:00:18	17	20	20
00:00:28	38	20	20
00:00:37	67	20	20
00:00:47	104	20	20
00:00:56	150	20	20
00:01:05	202	20	20
00:01:15	269	20	20
00:01:25	344	20	22
00:01:35	425	20	22
00:01:44	517	20	23
00:01:54	618	20	23
00:02:04	729	20	23
00:02:13	843	20	24
00:02:23	968	20	24
00:02:33	1.105	21	25
00:02:42	1.247	21	25
00:02:52	1.395	22	26
00:03:02	1.560	22	26
00:03:11	1.731	22	27
00:03:21	1.908	22	28
00:03:30	2.090	23	28
00:03:40	2.292	23	29
00:03:50	2.499	23	29
00:04:00	2.713	24	30
00:04:09	2.930	24	31
00:04:19	3.167	24	32
00:04:29	3.406	25	32
00:04:38	3.655	25	33
00:04:48	3.918	25	33
00:04:58	4.189	26	34
00:05:08	4.465	26	34
00:05:17	4.746	26	35
00:05:27	5.048	27	35
00:05:37	5.354	27	36
00:05:47	5.500	27	36
00:05:55	5.500	28	36
00:06:05	5.500	28	37
00:06:14	5.500	29	37
00:06:22	5.500	29	37
00:06:31	5.500	29	37
00:06:40	5.500	30	37
00:06:49	5.500	30	37
00:06:59	5.500	30	38
00:07:08	5.500	31	38
00:07:17	5.500	31	38

00:07:27	5.500	31	38
00:07:37	5.500	32	38
00:07:45	5.500	32	38
00:07:52	5.500	32	39
00:08:00	5.500	32	39
00:08:08	5.500	33	39
00:08:14	5.500	33	39
00:08:14		Critical condition in room 'Part I': Smoke free height less than 5,20 m	
00:08:22	5.500	33	39
00:08:30	5.500	33	40
00:08:39	5.500	33	40
00:08:48	5.500	34	40
00:08:57	5.500	34	40
00:09:06	5.500	34	40
00:09:16	5.500	35	41
00:09:26	5.500	35	41
00:09:32	5.500	35	41
00:09:39	5.500	35	41
00:09:46	5.500	35	41
00:09:53	5.500	36	42
00:10:00	5.500	36	42
00:10:07	5.500	36	42
00:10:14	5.500	36	42
00:10:21	5.500	36	42
00:10:27	5.500	37	42
00:10:31	5.500	37	42
00:10:31		Critical condition in room 'Part II': Smoke free height less than 4,00 m	
00:10:38	5.500	37	43
00:10:44	5.500	37	43
00:10:52	5.500	37	43
00:10:59	5.500	38	43
00:11:06	5.500	38	43
00:11:13	5.500	38	44
00:11:19	5.500	38	44
00:11:26	5.500	38	44
00:11:33	5.500	38	44
00:11:40	5.500	39	44
00:11:46	5.500	39	45
00:11:53	5.500	39	45
00:12:00	5.500	39	45
00:12:09	5.500	40	45
00:12:18	5.500	40	46
00:12:27	5.500	40	46
00:12:37	5.500	40	46
00:12:46	5.500	41	46
00:12:55	5.500	41	47
00:13:05	5.500	41	47
00:13:15	5.500	42	47
00:13:22	5.500	42	48
00:13:29	5.500	42	48
00:13:36	5.500	42	48
00:13:44	5.500	42	48
00:13:51	5.500	43	49
00:13:59	5.500	43	49
00:14:08	5.500	43	49
00:14:16	5.500	43	49
00:14:25	5.500	44	50
00:14:35	5.500	44	50
00:14:40	5.500	44	50

00:14:45	5.500	44	50
00:14:51	5.500	45	51
00:14:56	5.500	45	51
00:15:02	5.500	45	51
00:15:08	5.500	45	51
00:15:14	5.500	45	51
00:15:21	5.500	46	52
00:15:29	5.500	46	52
00:15:29		Room 'Part I' is now filled with smoke	
00:15:36	5.500	46	52
00:15:43	5.500	46	52
00:15:50	5.500	46	53
00:16:00	5.500	47	53
00:16:06	5.500	47	53
00:16:14	5.500	47	53
00:16:22	5.500	47	54
00:16:32	5.500	48	54
00:16:41	5.500	48	54
00:16:49	5.500	48	55
00:16:59	5.500	49	55
00:17:08	5.500	49	55
00:17:16	5.500	49	55
00:17:26	5.500	49	56
00:17:35	5.500	50	56
00:17:43	5.500	50	56
00:17:52	5.500	50	57
00:18:02	5.500	51	57
00:18:10	5.500	51	57
00:18:19	5.500	51	57
00:18:28	5.500	51	58
00:18:36	5.500	52	58
00:18:45	5.500	52	58
00:18:54	5.500	52	59
00:19:03	5.500	53	59
00:19:12	5.500	53	59
00:19:21	5.500	53	59
00:19:29	5.500	53	60
00:19:38	5.500	54	60
00:19:47	5.500	54	60
00:19:56	5.500	54	61
00:20:04	5.500	54	61
00:20:14	5.500	55	61
00:20:22	5.500	55	61
00:20:31	5.500	55	62
00:20:40	5.500	56	62
00:20:48	5.500	56	62
00:20:57	5.500	56	63
00:21:06	5.500	56	63
00:21:14	5.500	57	63
00:21:23	5.500	57	63
00:21:32	5.500	57	64
00:21:40	5.500	57	64
00:21:49	5.500	58	64
00:21:58	5.500	58	64
00:22:06	5.500	58	65
00:22:15	5.500	58	65
00:22:24	5.500	59	65
00:22:32	5.500	59	65
00:22:41	5.500	59	66

00:22:49	5.500	60	66
00:22:58	5.500	60	66
00:23:06	5.500	60	67
00:23:15	5.500	60	67
00:23:24	5.500	61	67
00:23:32	5.500	61	67
00:23:41	5.500	61	68
00:23:45	5.500	61	68
00:23:45		Room 'Part II' is now filled with smoke	
00:23:54	5.500	61	68
00:24:02	5.500	62	68
00:24:11	5.500	62	69
00:24:19	5.500	62	69
00:24:28	5.500	63	69
00:24:36	5.500	63	69
00:24:45	5.500	63	70
00:24:53	5.500	63	70
00:25:02	5.500	64	70
00:25:10	5.500	64	70
00:25:19	5.500	64	71
00:25:27	5.500	64	71
00:25:36	5.500	65	71
00:25:44	5.500	65	71
00:25:53	5.500	65	72
00:26:01	5.500	65	72
00:26:09	5.500	66	72
00:26:18	5.500	66	72
00:26:26	5.500	66	73
00:26:35	5.500	66	73
00:26:43	5.500	67	73
00:26:51	5.500	67	73
00:27:00	5.500	67	74
00:27:08	5.500	67	74
00:27:17	5.500	68	74
00:27:25	5.500	68	74
00:27:33	5.500	68	75
00:27:42	5.500	68	75
00:27:50	5.500	69	75
00:27:58	5.500	69	75
00:28:07	5.500	69	76
00:28:15	5.500	69	76
00:28:23	5.500	70	76
00:28:32	5.500	70	76
00:28:40	5.500	70	77
00:28:48	5.500	70	77
00:28:56	5.500	71	77
00:29:05	5.500	71	77
00:29:13	5.500	71	78
00:29:21	5.500	71	78
00:29:29	5.500	71	78
00:29:38	5.500	72	78
00:29:46	5.500	72	79
00:29:54	5.500	72	79
00:30:02	5.500	72	79
00:30:11	5.500	73	79
00:30:19	5.500	73	80
00:30:27	5.500	73	80
00:30:35	5.500	73	80
00:30:43	5.500	74	80

00:30:52	5.500	74	81
00:31:00	5.500	74	81
00:31:08	5.500	74	81
00:31:16	5.500	75	81
00:31:24	5.500	75	82
00:31:32	5.500	75	82
00:31:41	5.500	75	82
00:31:49	5.500	76	82
00:31:57	5.500	76	83
00:32:05	5.500	76	83
00:32:13	5.500	76	83
00:32:21	5.500	76	83
00:32:29	5.500	77	83
00:32:37	5.500	77	84
00:32:45	5.500	77	84
00:32:54	5.500	77	84
00:33:02	5.500	78	84
00:33:10	5.500	78	85
00:33:18	5.500	78	85
00:33:26	5.500	78	85
00:33:34	5.500	79	85
00:33:42	5.500	79	86
00:33:50	5.500	79	86
00:33:58	5.500	79	86
00:34:06	5.500	79	86
00:34:14	5.500	80	87
00:34:22	5.500	80	87
00:34:30	5.500	80	87
00:34:38	5.500	80	87
00:34:46	5.500	81	87
00:34:54	5.500	81	88
00:35:02	5.500	81	88
00:35:10	5.500	81	88
00:35:18	5.500	82	88
00:35:26	5.500	82	89
00:35:34	5.500	82	89
00:35:42	5.500	82	89
00:35:50	5.500	82	89
00:35:58	5.500	83	90
00:36:06	5.500	83	90
00:36:14	5.500	83	90
00:36:22	5.500	83	90
00:36:30	5.500	84	90
00:36:38	5.500	84	91
00:36:45	5.500	84	91
00:36:53	5.500	84	91
00:37:01	5.500	84	91
00:37:09	5.500	85	92
00:37:17	5.500	85	92
00:37:25	5.500	85	92
00:37:33	5.500	85	92
00:37:41	5.500	86	92
00:37:49	5.500	86	93
00:37:56	5.500	86	93
00:38:04	5.500	86	93
00:38:12	5.500	86	93
00:38:20	5.500	87	94
00:38:28	5.500	87	94
00:38:36	5.500	87	94

00:38:43	5.500	87	94
00:38:51	5.500	88	95
00:38:59	5.500	88	95
00:39:07	5.500	88	95
00:39:15	5.500	88	95
00:39:22	5.500	88	95
00:39:30	5.500	89	96
00:39:38	5.500	89	96
00:39:46	5.500	89	96
00:39:53	5.500	89	96
00:40:00	5.500	89	96
00:40:00		Fire brigade is alarmed	
00:40:07	5.500	90	97
00:40:15	5.500	90	97
00:40:23	5.500	90	97
00:40:31	5.500	90	97
00:40:38	5.500	91	98
00:40:46	5.500	91	98
00:40:54	5.500	91	98
00:41:01	5.500	91	98
00:41:09	5.500	91	98
00:41:17	5.500	92	99
00:41:24	5.500	92	99
00:41:32	5.500	92	99
00:41:40	5.500	92	99
00:41:48	5.500	92	99
00:41:55	5.500	93	100
00:42:03	5.500	93	100
00:42:11	5.500	93	100
00:42:18	5.500	93	100
00:42:26	5.500	93	101
00:42:34	5.500	94	101
00:42:41	5.500	94	101
00:42:49	5.500	94	101
00:42:57	5.500	94	101
00:43:04	5.500	95	102
00:43:12	5.500	95	102
00:43:19	5.500	95	102
00:43:27	5.500	95	102
00:43:35	5.500	95	102
00:43:42	5.500	96	103
00:43:50	5.500	96	103
00:43:58	5.500	96	103
00:44:05	5.500	96	103
00:44:13	5.500	96	104
00:44:20	5.500	97	104
00:44:28	5.500	97	104
00:44:36	5.500	97	104
00:44:43	5.500	97	104
00:44:51	5.500	97	105
00:44:58	5.500	98	105
00:45:06	5.500	98	105
00:45:13	5.500	98	105
00:45:21	5.500	98	105
00:45:29	5.500	98	106
00:45:36	5.500	99	106
00:45:43	5.500	99	106
00:45:51	5.500	99	106
00:45:58	5.500	99	106

00:46:06	5.500	99	107
00:46:14	5.500	100	107
00:46:21	5.500	100	107
00:46:29	5.500	100	107
00:46:36	5.500	100	107
00:46:44	5.500	100	108
00:46:51	5.500	101	108
00:46:59	5.500	101	108
00:47:06	5.500	101	108
00:47:13	5.500	101	108
00:47:21	5.500	101	109
00:47:28	5.500	102	109
00:47:36	5.500	102	109
00:47:43	5.500	102	109
00:47:51	5.500	102	109
00:47:58	5.500	102	110
00:48:06	5.500	103	110
00:48:13	5.500	103	110
00:48:21	5.500	103	110
00:48:28	5.500	103	110
00:48:35	5.500	103	111
00:48:43	5.500	104	111
00:48:50	5.500	104	111
00:48:58	5.500	104	111
00:49:05	5.500	104	111
00:49:13	5.500	104	112
00:49:20	5.500	105	112
00:49:27	5.500	105	112
00:49:35	5.500	105	112
00:49:42	5.500	105	112
00:49:49	5.500	105	113
00:49:57	5.500	106	113
00:50:04	5.500	106	113
00:50:11	5.500	106	113
00:50:19	5.500	106	113
00:50:26	5.500	106	114
00:50:33	5.500	107	114
00:50:41	5.500	107	114
00:50:48	5.500	107	114
00:50:55	5.500	107	114
00:51:03	5.500	107	115
00:51:10	5.500	108	115
00:51:17	5.500	108	115
00:51:25	5.500	108	115
00:51:32	5.500	108	115
00:51:39	5.500	108	116
00:51:47	5.500	109	116
00:51:54	5.500	109	116
00:52:01	5.500	109	116
00:52:09	5.500	109	116
00:52:16	5.500	109	117
00:52:23	5.500	109	117
00:52:30	5.500	110	117
00:52:38	5.500	110	117
00:52:45	5.500	110	117
00:52:52	5.500	110	118
00:53:00	5.500	110	118
00:53:07	5.500	111	118
00:53:14	5.500	111	118

00:53:21	5.500	111	118
00:53:28	5.500	111	119
00:53:36	5.500	111	119
00:53:43	5.500	112	119
00:53:50	5.500	112	119
00:53:57	5.500	112	119
00:54:05	5.500	112	119
00:54:12	5.500	112	120
00:54:19	5.500	112	120
00:54:26	5.500	113	120
00:54:33	5.500	113	120
00:54:41	5.500	113	120
00:54:48	5.500	113	121
00:54:55	5.500	113	121
00:55:00	5.500	114	121
00:55:00		Fire brigade arrived, preparing extinguishing	
00:55:07	5.500	114	121
00:55:14	5.500	114	121
00:55:21	5.500	114	121
00:55:28	5.500	114	122
00:55:35	5.500	114	122
00:55:43	5.500	115	122
00:55:50	5.500	115	122
00:56:00	5.500	115	122
00:56:00		Fire brigade ready, extinguishing started	
00:56:07	5.500	115	123
00:56:14	5.500	115	123
00:56:21	5.500	116	123
00:56:30	5.500	116	123
00:56:31	5.440	116	123
00:56:31		Fire is declining	
00:56:41	5.123	116	123
00:56:50	4.807	116	124
00:57:00	4.490	117	124
00:57:09	4.174	117	123
00:57:19	3.858	117	123
00:57:28	3.541	117	123
00:57:38	3.225	117	123
00:57:47	2.908	117	123
00:57:57	2.592	117	122
00:58:06	2.275	117	122
00:58:16	1.959	117	122
00:58:25	1.642	117	121
00:58:35	1.326	117	121
00:58:45	998	117	120
00:58:54	682	117	120
00:59:04	365	116	119
00:59:13	49	116	118
00:59:15	0	116	118
00:59:15		Fire has been put out	

Simulation results for each room

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:00:00	0,00		36,00	20		-0,010
00:00:09	0,00		36,00	20		0,000
00:00:18	0,00		36,00	20		0,000
00:00:28	0,00		36,00	20		0,000
00:00:37	0,00		36,00	20		0,000
00:00:47	0,00		36,00	20		0,000
00:00:56	0,00		36,00	20		0,000
00:01:05	0,00		36,00	20		0,000
00:01:15	0,00		36,00	20		0,000
00:01:25	0,00		36,00	20		0,022
00:01:35	0,00		36,00	20		0,029
00:01:44	0,00		36,00	20		0,035
00:01:54	0,00		36,00	20		0,039
00:02:04	0,00		36,00	20		0,044
00:02:13	0,01		36,00	20		0,047
00:02:23	0,01		36,00	20		0,050
00:02:33	0,01	0,09	35,53	21		0,240
00:02:42	0,01	0,10	33,51	21	0,09	0,303
00:02:52	0,01	0,11	31,66	22	0,10	0,375
00:03:02	0,01	0,12	29,85	22	0,11	0,464
00:03:11	0,01	0,14	28,21	22	0,12	0,565
00:03:21	0,01	0,15	26,73	22	0,13	0,680
00:03:30	0,01	0,17	25,39	23	0,14	0,808
00:03:40	0,01	0,19	24,10	23	0,15	0,963
00:03:50	0,01	0,21	22,92	23	0,15	1,136
00:04:00	0,01	0,23	21,84	24	0,16	1,327
00:04:09	0,01	0,25	20,84	24	0,17	1,537
00:04:19	0,01	0,28	19,83	24	0,18	1,784
00:04:29	0,01	0,30	18,88	25	0,20	2,051
00:04:38	0,01	0,32	18,00	25	0,21	2,353
00:04:48	0,01	0,34	17,16	25	0,22	2,699
00:04:58	0,01	0,36	16,35	26	0,23	3,085
00:05:08	0,01	0,38	15,58	26	0,24	3,505
00:05:17	0,01	0,40	14,83	26	0,25	3,959
00:05:27	0,01	0,43	14,07	27	0,26	4,477
00:05:37	0,01	0,45	13,33	27	0,27	5,034
00:05:47	0,01	0,48	12,61	27	0,28	5,239
00:05:55	0,01	0,50	12,02	28	0,29	5,140
00:06:05	0,01	0,53	11,35	28	0,30	5,033
00:06:14	0,01	0,55	10,81	29	0,31	4,950
00:06:22	0,01	0,57	10,27	29	0,32	4,869
00:06:31	0,01	0,59	9,75	29	0,33	4,793
00:06:40	0,01	0,61	9,25	30	0,34	4,720
00:06:49	0,01	0,63	8,78	30	0,35	4,651
00:06:59	0,01	0,66	8,31	30	0,36	4,585
00:07:08	0,01	0,68	7,86	31	0,37	4,520
00:07:17	0,01	0,70	7,42	31	0,37	4,458
00:07:27	0,01	0,72	6,99	31	0,38	4,398
00:07:37	0,01	0,74	6,57	32	0,39	4,339
00:07:45	0,01	0,76	6,26	32	0,39	4,295
00:07:52	0,01	0,78	5,96	32	0,40	4,253
00:08:00	0,01	0,79	5,66	32	0,40	4,211
00:08:08	0,01	0,81	5,36	33	0,41	4,169

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:14	0,01	0,82	5,17	33	0,41	4,142
00:08:14	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:08:22	0,01	0,84	4,88	33	0,42	4,102
00:08:30	0,01	0,86	4,59	33	0,42	4,063
00:08:39	0,01	0,88	4,31	33	0,43	4,024
00:08:48	0,01	0,89	4,03	34	0,43	3,986
00:08:57	0,01	0,91	3,75	34	0,44	3,948
00:09:06	0,01	0,93	3,48	34	0,44	3,912
00:09:16	0,01	0,95	3,21	35	0,44	3,876
00:09:26	0,01	0,97	2,95	35	0,45	3,841
00:09:32	0,01	0,99	2,78	35	0,45	3,818
00:09:39	0,01	1,00	2,61	35	0,45	3,796
00:09:46	0,01	1,01	2,44	35	0,45	3,775
00:09:53	0,01	1,03	2,27	36	0,46	3,754
00:10:00	0,01	1,04	2,11	36	0,46	3,734
00:10:07	0,01	1,06	1,94	36	0,46	3,712
00:10:14	0,00	1,07	1,80	36	0,46	3,686
00:10:21	0,00	1,08	1,66	36	0,46	3,659
00:10:27	0,00	1,10	1,53	37	0,47	3,630
00:10:31	0,00	1,11	1,46	37	0,47	3,616
00:10:31	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:10:38	0,00	1,12	1,34	37	0,47	3,587
00:10:44	0,00	1,13	1,22	37	0,47	3,557
00:10:52	0,00	1,15	1,08	37	0,47	3,523
00:10:59	0,00	1,16	0,98	38	0,47	3,495
00:11:06	0,00	1,18	0,88	38	0,48	3,469
00:11:13	0,00	1,19	0,79	38	0,48	3,444
00:11:19	0,00	1,20	0,70	38	0,48	3,421
00:11:26	0,00	1,22	0,62	38	0,48	3,401
00:11:33	0,00	1,23	0,55	38	0,48	3,383
00:11:40	0,00	1,25	0,48	39	0,48	3,368
00:11:46	0,00	1,26	0,42	39	0,48	3,357
00:11:53	0,00	1,27	0,36	39	0,48	3,348
00:12:00	0,00	1,29	0,31	39	0,49	3,343
00:12:09	0,00	1,31	0,25	40	0,49	3,328
00:12:18	0,00	1,33	0,20	40	0,49	3,310
00:12:27	0,00	1,35	0,16	40	0,49	3,291
00:12:37	0,00	1,37	0,13	40	0,49	3,271
00:12:46	0,00	1,39	0,10	41	0,49	3,249
00:12:55	0,00	1,41	0,07	41	0,50	3,226
00:13:05	0,00	1,43	0,06	41	0,50	3,202
00:13:15	0,00	1,45	0,04	42	0,50	3,176
00:13:22	0,00	1,47	0,03	42	0,50	3,157
00:13:29	0,00	1,49	0,03	42	0,50	3,138
00:13:36	0,00	1,50	0,02	42	0,50	3,118
00:13:44	0,00	1,52	0,02	42	0,51	3,096
00:13:51	0,00	1,54	0,01	43	0,51	3,074
00:13:59	0,00	1,56	0,01	43	0,51	3,051
00:14:08	0,00	1,58	0,01	43	0,51	3,026
00:14:16	0,00	1,60	0,01	43	0,51	2,999
00:14:25	0,00	1,62		44	0,51	2,972
00:14:35	0,00	1,64		44	0,52	2,942
00:14:40	0,00	1,65		44	0,52	2,927
00:14:45	0,00	1,67		44	0,52	2,911
00:14:51	0,00	1,68		45	0,52	2,895
00:14:56	0,00	1,69		45	0,52	2,878

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:15:02	0,00	1,71		45	0,52	2,861
00:15:08	0,00	1,72		45	0,52	2,843
00:15:14	0,00	1,74		45	0,52	2,824
00:15:21	0,00	1,75		46	0,53	2,802
00:15:29	0,00	1,77		46	0,53	2,781
00:15:29	Room 'Part I' is now filled with smoke					
00:15:36	0,00	1,79		46	0,53	2,761
00:15:43	0,00	1,81		46	0,53	2,738
00:15:50	0,00	1,82		46	0,53	2,720
00:16:00	0,00	1,85		47	0,53	2,691
00:16:06	0,00	1,86		47	0,54	2,677
00:16:14	0,00	1,88		47	0,54	2,653
00:16:22	0,00	1,90		47	0,54	2,631
00:16:32	0,00	1,93		48	0,54	2,605
00:16:41	0,00	1,95		48	0,54	2,582
00:16:49	0,00	1,97		48	0,55	2,561
00:16:59	0,00	1,99		49	0,55	2,537
00:17:08	0,00	2,02		49	0,55	2,514
00:17:16	0,00	2,04		49	0,55	2,494
00:17:26	0,00	2,06		49	0,55	2,473
00:17:35	0,00	2,08		50	0,55	2,452
00:17:43	0,00	2,10		50	0,56	2,434
00:17:52	0,00	2,13		50	0,56	2,415
00:18:02	0,00	2,15		51	0,56	2,395
00:18:10	0,00	2,17		51	0,56	2,379
00:18:19	0,00	2,19		51	0,56	2,365
00:18:28	0,00	2,21		51	0,57	2,347
00:18:36	0,00	2,23		52	0,57	2,332
00:18:45	0,00	2,26		52	0,57	2,316
00:18:54	0,00	2,28		52	0,57	2,301
00:19:03	0,00	2,30		53	0,57	2,286
00:19:12	0,00	2,32		53	0,58	2,270
00:19:21	0,00	2,34		53	0,58	2,255
00:19:29	0,00	2,36		53	0,58	2,240
00:19:38	0,00	2,39		54	0,58	2,223
00:19:47	0,00	2,41		54	0,58	2,208
00:19:56	0,00	2,43		54	0,59	2,194
00:20:04	0,00	2,45		54	0,59	2,180
00:20:14	0,00	2,47		55	0,59	2,165
00:20:22	0,00	2,49		55	0,59	2,151
00:20:31	0,00	2,51		55	0,59	2,135
00:20:40	0,00	2,54		56	0,60	2,120
00:20:48	0,00	2,56		56	0,60	2,107
00:20:57	0,00	2,58		56	0,60	2,094
00:21:06	0,00	2,60		56	0,60	2,080
00:21:14	0,00	2,62		57	0,60	2,066
00:21:23	0,00	2,64		57	0,61	2,051
00:21:32	0,00	2,66		57	0,61	2,037
00:21:40	0,00	2,69		57	0,61	2,025
00:21:49	0,00	2,71		58	0,61	2,012
00:21:58	0,00	2,73		58	0,61	1,998
00:22:06	0,00	2,75		58	0,62	1,983
00:22:15	0,00	2,77		58	0,62	1,970
00:22:24	0,00	2,79		59	0,62	1,958
00:22:32	0,00	2,81		59	0,62	1,944
00:22:41	0,00	2,83		59	0,62	1,932

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:22:49	0,00	2,85		60	0,63	1,917
00:22:58	0,00	2,87		60	0,63	1,904
00:23:06	0,00	2,89		60	0,63	1,893
00:23:15	0,00	2,92		60	0,63	1,880
00:23:24	0,00	2,94		61	0,63	1,867
00:23:32	0,00	2,96		61	0,64	1,853
00:23:41	0,00	2,98		61	0,64	1,841
00:23:45	0,00	2,99		61	0,64	1,833
00:23:45	Room 'Part II' is now filled with smoke					
00:23:54	0,00	3,01		61	0,64	1,821
00:24:02	0,00	3,03		62	0,64	1,810
00:24:11	0,00	3,05		62	0,64	1,797
00:24:19	0,00	3,07		62	0,65	1,783
00:24:28	0,00	3,09		63	0,65	1,771
00:24:36	0,00	3,11		63	0,65	1,760
00:24:45	0,00	3,13		63	0,65	1,748
00:24:53	0,00	3,15		63	0,65	1,736
00:25:02	0,00	3,17		64	0,66	1,722
00:25:10	0,00	3,19		64	0,66	1,711
00:25:19	0,00	3,21		64	0,66	1,699
00:25:27	0,00	3,23		64	0,66	1,685
00:25:36	0,00	3,25		65	0,66	1,674
00:25:44	0,00	3,27		65	0,67	1,663
00:25:53	0,00	3,29		65	0,67	1,651
00:26:01	0,00	3,31		65	0,67	1,638
00:26:09	0,00	3,33		66	0,67	1,628
00:26:18	0,00	3,35		66	0,67	1,616
00:26:26	0,00	3,37		66	0,68	1,604
00:26:35	0,00	3,39		66	0,68	1,591
00:26:43	0,00	3,41		67	0,68	1,581
00:26:51	0,00	3,43		67	0,68	1,569
00:27:00	0,00	3,45		67	0,68	1,556
00:27:08	0,00	3,47		67	0,69	1,546
00:27:17	0,00	3,49		68	0,69	1,535
00:27:25	0,00	3,51		68	0,69	1,521
00:27:33	0,00	3,53		68	0,69	1,512
00:27:42	0,00	3,55		68	0,69	1,500
00:27:50	0,00	3,57		69	0,70	1,489
00:27:58	0,00	3,59		69	0,70	1,476
00:28:07	0,00	3,61		69	0,70	1,466
00:28:15	0,00	3,63		69	0,70	1,455
00:28:23	0,00	3,65		70	0,70	1,442
00:28:32	0,00	3,67		70	0,71	1,433
00:28:40	0,00	3,69		70	0,71	1,422
00:28:48	0,00	3,71		70	0,71	1,409
00:28:56	0,00	3,73		71	0,71	1,399
00:29:05	0,00	3,75		71	0,71	1,389
00:29:13	0,00	3,77		71	0,72	1,375
00:29:21	0,00	3,79		71	0,72	1,366
00:29:29	0,00	3,81		71	0,72	1,356
00:29:38	0,00	3,83		72	0,72	1,343
00:29:46	0,00	3,85		72	0,72	1,334
00:29:54	0,00	3,86		72	0,73	1,323
00:30:02	0,00	3,88		72	0,73	1,310
00:30:11	0,00	3,90		73	0,73	1,301
00:30:19	0,00	3,92		73	0,73	1,291

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:30:27	0,00	3,94		73	0,73	1,278
00:30:35	0,00	3,96		73	0,74	1,269
00:30:43	0,00	3,98		74	0,74	1,259
00:30:52	0,00	4,00		74	0,74	1,246
00:31:00	0,00	4,02		74	0,74	1,237
00:31:08	0,00	4,04		74	0,74	1,227
00:31:16	0,00	4,06		75	0,75	1,214
00:31:24	0,00	4,08		75	0,75	1,206
00:31:32	0,00	4,09		75	0,75	1,194
00:31:41	0,00	4,11		75	0,75	1,185
00:31:49	0,00	4,13		76	0,75	1,175
00:31:57	0,00	4,15		76	0,76	1,162
00:32:05	0,00	4,17		76	0,76	1,154
00:32:13	0,00	4,19		76	0,76	1,144
00:32:21	0,00	4,21		76	0,76	1,131
00:32:29	0,00	4,23		77	0,76	1,123
00:32:37	0,00	4,24		77	0,77	1,111
00:32:45	0,00	4,26		77	0,77	1,103
00:32:54	0,00	4,28		77	0,77	1,092
00:33:02	0,00	4,30		78	0,77	1,080
00:33:10	0,00	4,32		78	0,77	1,072
00:33:18	0,00	4,34		78	0,78	1,060
00:33:26	0,00	4,36		78	0,78	1,052
00:33:34	0,00	4,37		79	0,78	1,042
00:33:42	0,00	4,39		79	0,78	1,030
00:33:50	0,00	4,41		79	0,79	1,022
00:33:58	0,00	4,43		79	0,79	1,010
00:34:06	0,00	4,45		79	0,79	1,002
00:34:14	0,00	4,47		80	0,79	0,992
00:34:22	0,00	4,49		80	0,79	0,981
00:34:30	0,00	4,50		80	0,80	0,973
00:34:38	0,00	4,52		80	0,80	0,961
00:34:46	0,00	4,54		81	0,80	0,953
00:34:54	0,00	4,56		81	0,80	0,943
00:35:02	0,00	4,58		81	0,80	0,934
00:35:10	0,00	4,60		81	0,81	0,924
00:35:18	0,00	4,61		82	0,81	0,912
00:35:26	0,00	4,63		82	0,81	0,905
00:35:34	0,00	4,65		82	0,81	0,893
00:35:42	0,00	4,67		82	0,81	0,885
00:35:50	0,00	4,69		82	0,82	0,876
00:35:58	0,00	4,70		83	0,82	0,866
00:36:06	0,00	4,72		83	0,82	0,857
00:36:14	0,00	4,74		83	0,82	0,845
00:36:22	0,00	4,76		83	0,82	0,838
00:36:30	0,00	4,78		84	0,83	0,826
00:36:38	0,00	4,79		84	0,83	0,819
00:36:45	0,00	4,81		84	0,83	0,808
00:36:53	0,00	4,83		84	0,83	0,800
00:37:01	0,00	4,85		84	0,83	0,791
00:37:09	0,00	4,87		85	0,84	0,782
00:37:17	0,00	4,88		85	0,84	0,772
00:37:25	0,00	4,90		85	0,84	0,763
00:37:33	0,00	4,92		85	0,84	0,754
00:37:41	0,00	4,94		86	0,85	0,745
00:37:49	0,00	4,96		86	0,85	0,736

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:37:56	0,00	4,97		86	0,85	0,724
00:38:04	0,00	4,99		86	0,85	0,717
00:38:12	0,00	5,01		86	0,85	0,706
00:38:20	0,00	5,03		87	0,86	0,699
00:38:28	0,00	5,04		87	0,86	0,688
00:38:36	0,00	5,06		87	0,86	0,681
00:38:43	0,00	5,08		87	0,86	0,670
00:38:51	0,00	5,10		88	0,86	0,663
00:38:59	0,00	5,11		88	0,87	0,652
00:39:07	0,00	5,13		88	0,87	0,645
00:39:15	0,00	5,15		88	0,87	0,634
00:39:22	0,00	5,17		88	0,87	0,627
00:39:30	0,00	5,18		89	0,87	0,616
00:39:38	0,00	5,20		89	0,88	0,610
00:39:46	0,00	5,22		89	0,88	0,599
00:39:53	0,00	5,24		89	0,88	0,592
00:40:00	0,00	5,25		89	0,88	0,581
00:40:00	Fire brigade is alarmed					
00:40:07	0,00	5,27		90	0,88	0,574
00:40:15	0,00	5,28		90	0,89	0,568
00:40:23	0,00	5,30		90	0,89	0,557
00:40:31	0,00	5,32		90	0,89	0,551
00:40:38	0,00	5,34		91	0,89	0,540
00:40:46	0,00	5,35		91	0,89	0,533
00:40:54	0,00	5,37		91	0,90	0,522
00:41:01	0,00	5,39		91	0,90	0,516
00:41:09	0,00	5,40		91	0,90	0,508
00:41:17	0,00	5,42		92	0,90	0,499
00:41:24	0,00	5,44		92	0,91	0,491
00:41:32	0,00	5,46		92	0,91	0,482
00:41:40	0,00	5,47		92	0,91	0,474
00:41:48	0,00	5,49		92	0,91	0,466
00:41:55	0,00	5,51		93	0,91	0,457
00:42:03	0,00	5,52		93	0,92	0,449
00:42:11	0,00	5,54		93	0,92	0,440
00:42:18	0,00	5,56		93	0,92	0,432
00:42:26	0,00	5,57		93	0,92	0,424
00:42:34	0,00	5,59		94	0,92	0,413
00:42:41	0,00	5,61		94	0,93	0,407
00:42:49	0,00	5,63		94	0,93	0,396
00:42:57	0,00	5,64		94	0,93	0,391
00:43:04	0,00	5,66		95	0,93	0,380
00:43:12	0,00	5,68		95	0,93	0,374
00:43:19	0,00	5,69		95	0,94	0,366
00:43:27	0,00	5,71		95	0,94	0,358
00:43:35	0,00	5,73		95	0,94	0,350
00:43:42	0,00	5,74		96	0,94	0,342
00:43:50	0,00	5,76		96	0,95	0,334
00:43:58	0,00	5,78		96	0,95	0,323
00:44:05	0,00	5,79		96	0,95	0,318
00:44:13	0,00	5,81		96	0,95	0,307
00:44:20	0,00	5,83		97	0,95	0,302
00:44:28	0,00	5,84		97	0,96	0,294
00:44:36	0,00	5,86		97	0,96	0,286
00:44:43	0,00	5,88		97	0,96	0,278
00:44:51	0,00	5,89		97	0,96	0,271

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:44:58	0,00	5,91		98	0,96	0,263
00:45:06	0,00	5,93		98	0,97	0,252
00:45:13	0,00	5,94		98	0,97	0,247
00:45:21	0,00	5,96		98	0,97	0,239
00:45:29	0,00	5,97		98	0,97	0,231
00:45:36	0,00	5,99		99	0,98	0,224
00:45:43	0,00	6,01		99	0,98	0,213
00:45:51	0,00	6,02		99	0,98	0,208
00:45:58	0,00	6,04		99	0,98	0,201
00:46:06	0,00	6,06		99	0,98	0,193
00:46:14	0,00	6,07		100	0,99	0,185
00:46:21	0,00	6,09		100	0,99	0,175
00:46:29	0,00	6,11		100	0,99	0,170
00:46:36	0,00	6,12		100	0,99	0,163
00:46:44	0,00	6,14		100	0,99	0,155
00:46:51	0,00	6,15		101	1,00	0,148
00:46:59	0,00	6,17		101	1,00	0,138
00:47:06	0,00	6,19		101	1,00	0,133
00:47:13	0,00	6,20		101	1,00	0,126
00:47:21	0,00	6,22		101	1,01	0,118
00:47:28	0,00	6,23		102	1,01	0,111
00:47:36	0,00	6,25		102	1,01	0,101
00:47:43	0,00	6,27		102	1,01	0,096
00:47:51	0,00	6,28		102	1,01	0,089
00:47:58	0,00	6,30		102	1,02	0,082
00:48:06	0,00	6,32		103	1,02	0,074
00:48:13	0,00	6,33		103	1,02	0,065
00:48:21	0,00	6,35		103	1,02	0,060
00:48:28	0,00	6,36		103	1,02	0,053
00:48:35	0,00	6,38		103	1,03	0,043
00:48:43	0,00	6,40		104	1,03	0,039
00:48:50	0,00	6,41		104	1,03	0,032
00:48:58	0,00	6,43		104	1,03	0,025
00:49:05	0,00	6,44		104	1,04	0,018
00:49:13	0,00	6,46		104	1,04	0,011
00:49:20	0,00	6,47		105	1,04	0,004
00:49:27	0,00	6,49		105	1,04	-0,002
00:49:35	0,00	6,51		105	1,04	-0,012
00:49:42	0,00	6,52		105	1,05	-0,016
00:49:49	0,00	6,54		105	1,05	-0,022
00:49:57	0,00	6,55		106	1,05	-0,032
00:50:04	0,00	6,57		106	1,05	-0,035
00:50:11	0,00	6,59		106	1,05	-0,042
00:50:19	0,00	6,60		106	1,06	-0,051
00:50:26	0,00	6,62		106	1,06	-0,054
00:50:33	0,00	6,63		107	1,06	-0,061
00:50:41	0,00	6,65		107	1,06	-0,070
00:50:48	0,00	6,66		107	1,07	-0,074
00:50:55	0,00	6,68		107	1,07	-0,080
00:51:03	0,00	6,69		107	1,07	-0,086
00:51:10	0,00	6,71		108	1,07	-0,093
00:51:17	0,00	6,73		108	1,07	-0,099
00:51:25	0,00	6,74		108	1,08	-0,105
00:51:32	0,00	6,76		108	1,08	-0,111
00:51:39	0,00	6,77		108	1,08	-0,117
00:51:47	0,00	6,79		109	1,08	-0,124

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:51:54	0,00	6,80		109	1,09	-0,133
00:52:01	0,00	6,82		109	1,09	-0,136
00:52:09	0,00	6,83		109	1,09	-0,142
00:52:16	0,00	6,85		109	1,09	-0,151
00:52:23	0,00	6,86		109	1,09	-0,154
00:52:30	0,00	6,88		110	1,10	-0,161
00:52:38	0,00	6,90		110	1,10	-0,167
00:52:45	0,00	6,91		110	1,10	-0,173
00:52:52	0,00	6,93		110	1,10	-0,179
00:53:00	0,00	6,94		110	1,10	-0,185
00:53:07	0,00	6,96		111	1,11	-0,194
00:53:14	0,00	6,97		111	1,11	-0,197
00:53:21	0,00	6,99		111	1,11	-0,203
00:53:28	0,00	7,00		111	1,11	-0,209
00:53:36	0,00	7,02		111	1,12	-0,215
00:53:43	0,00	7,03		112	1,12	-0,221
00:53:50	0,00	7,05		112	1,12	-0,227
00:53:57	0,00	7,06		112	1,12	-0,236
00:54:05	0,00	7,08		112	1,12	-0,239
00:54:12	0,00	7,09		112	1,13	-0,244
00:54:19	0,00	7,11		112	1,13	-0,250
00:54:26	0,00	7,12		113	1,13	-0,259
00:54:33	0,00	7,14		113	1,13	-0,262
00:54:41	0,00	7,15		113	1,14	-0,268
00:54:48	0,00	7,17		113	1,14	-0,274
00:54:55	0,00	7,18		113	1,14	-0,280
00:55:00	0,00	7,19		114	1,14	-0,285
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:07	0,00	7,21		114	1,14	-0,289
00:55:14	0,00	7,22		114	1,15	-0,295
00:55:21	0,00	7,24		114	1,15	-0,301
00:55:28	0,00	7,25		114	1,15	-0,306
00:55:35	0,00	7,27		114	1,15	-0,312
00:55:43	0,00	7,28		115	1,15	-0,318
00:55:50	0,00	7,30		115	1,16	-0,324
00:56:00	0,00	7,32		115	1,16	-0,332
00:56:00	Fire brigade ready, extinguishing started					
00:56:07	0,00	7,33		115	1,16	-0,337
00:56:14	0,00	7,35		115	1,16	-0,343
00:56:21	0,00	7,36		116	1,17	-0,349
00:56:30	0,00	7,38		116	1,17	-0,357
00:56:31	0,00	7,38		116	1,17	-0,411
00:56:31	Fire is declining					
00:56:41	0,00	7,40		116	1,17	-0,683
00:56:50	0,00	7,42		116	1,17	-0,951
00:57:00	0,00	7,44		117	1,18	-1,212
00:57:09	0,00	7,46		117	1,18	-1,467
00:57:19	0,00	7,48		117	1,18	-1,714
00:57:28	0,00	7,49		117	1,18	-1,955
00:57:38	0,00	7,51		117	1,18	-2,189
00:57:47	0,00	7,52		117	1,18	-2,418
00:57:57	0,00	7,53		117	1,18	-2,642
00:58:06	0,00	7,54		117	1,18	-2,865
00:58:16	0,00	7,55		117	1,18	-3,081
00:58:25	0,00	7,56		117	1,18	-3,294
00:58:35	0,00	7,57		117	1,18	-3,504

Part I

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:58:45	0,00	7,58		117	1,18	-3,720
00:58:54	0,00	7,58		117	1,18	-3,926
00:59:04	0,00	7,59		116	1,18	-4,127
00:59:13	0,00	7,59		116	1,17	-4,325
00:59:15	0,00	7,59		116	1,17	-4,358
00:59:15	Fire has been put out					

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:00:00	0,00		24,00	20		-0,005
00:00:09	0,00		24,00	20		0,000
00:00:18	0,00		24,00	20		0,000
00:00:28	0,00		24,00	20		0,000
00:00:37	0,00		24,00	20		0,000
00:00:47	0,00		24,00	20		0,000
00:00:56	0,00		24,00	20		0,000
00:01:05	0,01		24,00	20		0,000
00:01:15	0,01		24,00	20		0,000
00:01:25	0,01	0,14	23,43	22		0,022
00:01:35	0,01	0,15	22,57	22	0,12	0,028
00:01:44	0,01	0,17	21,78	23	0,13	0,034
00:01:54	0,01	0,19	21,13	23	0,13	0,037
00:02:04	0,01	0,21	20,60	23	0,14	0,038
00:02:13	0,01	0,23	20,20	24	0,14	0,039
00:02:23	0,01	0,26	19,89	24	0,15	0,038
00:02:33	0,01	0,28	19,66	25	0,15	0,224
00:02:42	0,01	0,31	19,50	25	0,15	0,283
00:02:52	0,01	0,34	19,39	26	0,15	0,351
00:03:02	0,01	0,37	19,31	26	0,15	0,436
00:03:11	0,01	0,40	19,27	27	0,16	0,534
00:03:21	0,01	0,43	19,24	28	0,16	0,645
00:03:30	0,01	0,47	19,22	28	0,16	0,770
00:03:40	0,01	0,50	19,22	29	0,16	0,922
00:03:50	0,01	0,54	19,21	29	0,16	1,092
00:04:00	0,01	0,57	19,19	30	0,16	1,282
00:04:09	0,01	0,60	19,14	31	0,17	1,492
00:04:19	0,01	0,64	19,05	32	0,17	1,738
00:04:29	0,01	0,68	18,89	32	0,17	2,008
00:04:38	0,01	0,71	18,62	33	0,18	2,313
00:04:48	0,01	0,74	18,23	33	0,18	2,661
00:04:58	0,01	0,77	17,78	34	0,19	3,045
00:05:08	0,01	0,79	17,30	34	0,20	3,464
00:05:17	0,01	0,81	16,81	35	0,20	3,916
00:05:27	0,01	0,84	16,28	35	0,21	4,431
00:05:37	0,01	0,86	15,74	36	0,22	4,984
00:05:47	0,01	0,89	15,20	36	0,23	5,187
00:05:55	0,01	0,90	14,74	36	0,24	5,087
00:06:05	0,01	0,92	14,19	37	0,25	4,982
00:06:14	0,01	0,93	13,71	37	0,26	4,899
00:06:22	0,01	0,94	13,22	37	0,26	4,818
00:06:31	0,01	0,95	12,74	37	0,27	4,741
00:06:40	0,01	0,96	12,26	37	0,28	4,668
00:06:49	0,01	0,97	11,80	37	0,29	4,598
00:06:59	0,01	0,99	11,34	38	0,30	4,531
00:07:08	0,01	1,00	10,90	38	0,31	4,466
00:07:17	0,01	1,01	10,46	38	0,32	4,402
00:07:27	0,01	1,03	10,02	38	0,33	4,340
00:07:37	0,01	1,04	9,59	38	0,34	4,280
00:07:45	0,01	1,06	9,28	38	0,35	4,235
00:07:52	0,01	1,07	8,96	39	0,35	4,190
00:08:00	0,01	1,08	8,65	39	0,36	4,146
00:08:08	0,01	1,09	8,34	39	0,37	4,103
00:08:14	0,01	1,10	8,13	39	0,37	4,074
00:08:14	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:08:22	0,01	1,12	7,83	39	0,38	4,031

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:30	0,01	1,13	7,52	40	0,39	3,989
00:08:39	0,01	1,15	7,22	40	0,40	3,946
00:08:48	0,01	1,16	6,92	40	0,40	3,904
00:08:57	0,01	1,18	6,62	40	0,41	3,861
00:09:06	0,01	1,20	6,33	40	0,42	3,819
00:09:16	0,01	1,21	6,03	41	0,42	3,776
00:09:26	0,01	1,23	5,74	41	0,43	3,732
00:09:32	0,01	1,24	5,54	41	0,44	3,703
00:09:39	0,01	1,25	5,35	41	0,44	3,674
00:09:46	0,01	1,27	5,15	41	0,45	3,643
00:09:53	0,01	1,28	4,96	42	0,45	3,613
00:10:00	0,01	1,29	4,77	42	0,45	3,582
00:10:07	0,01	1,31	4,57	42	0,46	3,546
00:10:14	0,01	1,32	4,40	42	0,46	3,506
00:10:21	0,01	1,33	4,22	42	0,47	3,462
00:10:27	0,01	1,34	4,05	42	0,47	3,415
00:10:31	0,01	1,35	3,97	42	0,47	3,390
00:10:31	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:10:38	0,01	1,36	3,80	43	0,48	3,338
00:10:44	0,01	1,38	3,63	43	0,48	3,283
00:10:52	0,01	1,39	3,44	43	0,48	3,215
00:10:59	0,01	1,41	3,29	43	0,49	3,156
00:11:06	0,01	1,42	3,14	43	0,49	3,094
00:11:13	0,01	1,43	2,99	44	0,49	3,031
00:11:19	0,01	1,45	2,84	44	0,50	2,966
00:11:26	0,01	1,46	2,70	44	0,50	2,900
00:11:33	0,01	1,47	2,55	44	0,50	2,833
00:11:40	0,01	1,49	2,42	44	0,51	2,765
00:11:46	0,01	1,50	2,28	45	0,51	2,697
00:11:53	0,01	1,52	2,15	45	0,51	2,628
00:12:00	0,01	1,53	2,02	45	0,51	2,559
00:12:09	0,01	1,55	1,85	45	0,52	2,451
00:12:18	0,01	1,57	1,69	46	0,52	2,343
00:12:27	0,01	1,59	1,54	46	0,52	2,230
00:12:37	0,01	1,62	1,40	46	0,53	2,115
00:12:46	0,01	1,64	1,27	46	0,53	1,999
00:12:55	0,00	1,66	1,15	47	0,53	1,883
00:13:05	0,00	1,68	1,03	47	0,53	1,766
00:13:15	0,00	1,71	0,92	47	0,54	1,651
00:13:22	0,00	1,73	0,86	48	0,54	1,574
00:13:29	0,00	1,74	0,79	48	0,54	1,498
00:13:36	0,00	1,76	0,73	48	0,54	1,423
00:13:44	0,00	1,78	0,67	48	0,54	1,348
00:13:51	0,00	1,80	0,62	49	0,55	1,274
00:13:59	0,00	1,82	0,57	49	0,55	1,200
00:14:08	0,00	1,84	0,52	49	0,55	1,127
00:14:16	0,00	1,86	0,47	49	0,55	1,054
00:14:25	0,00	1,88	0,42	50	0,55	0,982
00:14:35	0,00	1,90	0,38	50	0,56	0,910
00:14:40	0,00	1,92	0,36	50	0,56	0,874
00:14:45	0,00	1,93	0,34	50	0,56	0,839
00:14:51	0,00	1,94	0,32	51	0,56	0,803
00:14:56	0,00	1,96	0,31	51	0,56	0,767
00:15:02	0,00	1,97	0,29	51	0,56	0,732
00:15:08	0,00	1,99	0,27	51	0,56	0,696
00:15:14	0,00	2,00	0,25	51	0,57	0,661

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:15:21	0,00	2,02	0,24	52	0,57	0,620
00:15:29	0,00	2,04	0,22	52	0,57	0,580
00:15:29	Room 'Part I' is now filled with smoke					
00:15:36	0,00	2,05	0,20	52	0,57	0,544
00:15:43	0,00	2,07	0,19	52	0,57	0,507
00:15:50	0,00	2,09	0,18	53	0,57	0,474
00:16:00	0,00	2,11	0,16	53	0,58	0,429
00:16:06	0,00	2,13	0,15	53	0,58	0,406
00:16:14	0,00	2,15	0,14	53	0,58	0,371
00:16:22	0,00	2,17	0,13	54	0,58	0,338
00:16:32	0,00	2,19	0,12	54	0,58	0,300
00:16:41	0,00	2,21	0,11	54	0,59	0,268
00:16:49	0,00	2,23	0,10	55	0,59	0,240
00:16:59	0,00	2,26	0,09	55	0,59	0,208
00:17:08	0,00	2,28	0,08	55	0,59	0,179
00:17:16	0,00	2,30	0,08	55	0,59	0,153
00:17:26	0,00	2,32	0,07	56	0,60	0,126
00:17:35	0,00	2,35	0,07	56	0,60	0,100
00:17:43	0,00	2,37	0,06	56	0,60	0,078
00:17:52	0,00	2,39	0,06	57	0,60	0,054
00:18:02	0,00	2,41	0,05	57	0,61	0,031
00:18:10	0,00	2,43	0,05	57	0,61	0,012
00:18:19	0,00	2,45	0,05	57	0,61	-0,004
00:18:28	0,00	2,47	0,04	58	0,61	-0,023
00:18:36	0,00	2,49	0,04	58	0,61	-0,040
00:18:45	0,00	2,52	0,04	58	0,62	-0,057
00:18:54	0,00	2,54	0,03	59	0,62	-0,075
00:19:03	0,00	2,56	0,03	59	0,62	-0,091
00:19:12	0,00	2,58	0,03	59	0,62	-0,108
00:19:21	0,00	2,60	0,03	59	0,62	-0,124
00:19:29	0,00	2,62	0,03	60	0,63	-0,139
00:19:38	0,00	2,64	0,02	60	0,63	-0,155
00:19:47	0,00	2,67	0,02	60	0,63	-0,170
00:19:56	0,00	2,69	0,02	61	0,63	-0,185
00:20:04	0,00	2,71	0,02	61	0,64	-0,199
00:20:14	0,00	2,73	0,02	61	0,64	-0,214
00:20:22	0,00	2,75	0,02	61	0,64	-0,228
00:20:31	0,00	2,77	0,02	62	0,64	-0,242
00:20:40	0,00	2,79	0,01	62	0,64	-0,256
00:20:48	0,00	2,81	0,01	62	0,65	-0,270
00:20:57	0,00	2,83	0,01	63	0,65	-0,283
00:21:06	0,00	2,85	0,01	63	0,65	-0,297
00:21:14	0,00	2,88	0,01	63	0,65	-0,310
00:21:23	0,00	2,90	0,01	63	0,65	-0,322
00:21:32	0,00	2,92	0,01	64	0,66	-0,336
00:21:40	0,00	2,94	0,01	64	0,66	-0,348
00:21:49	0,00	2,96	0,01	64	0,66	-0,360
00:21:58	0,00	2,98	0,01	64	0,66	-0,373
00:22:06	0,00	3,00	0,01	65	0,66	-0,385
00:22:15	0,00	3,02	0,01	65	0,67	-0,397
00:22:24	0,00	3,04		65	0,67	-0,410
00:22:32	0,00	3,06		65	0,67	-0,422
00:22:41	0,00	3,08		66	0,67	-0,433
00:22:49	0,00	3,10		66	0,68	-0,445
00:22:58	0,00	3,12		66	0,68	-0,457
00:23:06	0,00	3,14		67	0,68	-0,468

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:15	0,00	3,16		67	0,68	-0,480
00:23:24	0,00	3,18		67	0,68	-0,492
00:23:32	0,00	3,20		67	0,69	-0,503
00:23:41	0,00	3,22		68	0,69	-0,514
00:23:45	0,00	3,23		68	0,69	-0,521
00:23:45	Room 'Part II' is now filled with smoke					
00:23:54	0,00	3,25		68	0,69	-0,532
00:24:02	0,00	3,27		68	0,69	-0,542
00:24:11	0,00	3,30		69	0,70	-0,553
00:24:19	0,00	3,31		69	0,70	-0,563
00:24:28	0,00	3,33		69	0,70	-0,574
00:24:36	0,00	3,36		69	0,70	-0,584
00:24:45	0,00	3,37		70	0,70	-0,594
00:24:53	0,00	3,39		70	0,71	-0,605
00:25:02	0,00	3,42		70	0,71	-0,615
00:25:10	0,00	3,43		70	0,71	-0,625
00:25:19	0,00	3,45		71	0,71	-0,635
00:25:27	0,00	3,47		71	0,71	-0,646
00:25:36	0,00	3,49		71	0,72	-0,655
00:25:44	0,00	3,51		71	0,72	-0,665
00:25:53	0,00	3,53		72	0,72	-0,676
00:26:01	0,00	3,55		72	0,72	-0,685
00:26:09	0,00	3,57		72	0,73	-0,695
00:26:18	0,00	3,59		72	0,73	-0,705
00:26:26	0,00	3,61		73	0,73	-0,715
00:26:35	0,00	3,63		73	0,73	-0,725
00:26:43	0,00	3,65		73	0,73	-0,735
00:26:51	0,00	3,67		73	0,74	-0,744
00:27:00	0,00	3,69		74	0,74	-0,754
00:27:08	0,00	3,71		74	0,74	-0,764
00:27:17	0,00	3,73		74	0,74	-0,773
00:27:25	0,00	3,75		74	0,74	-0,783
00:27:33	0,00	3,77		75	0,75	-0,793
00:27:42	0,00	3,79		75	0,75	-0,802
00:27:50	0,00	3,81		75	0,75	-0,811
00:27:58	0,00	3,83		75	0,75	-0,821
00:28:07	0,00	3,85		76	0,76	-0,830
00:28:15	0,00	3,87		76	0,76	-0,840
00:28:23	0,00	3,88		76	0,76	-0,849
00:28:32	0,00	3,90		76	0,76	-0,859
00:28:40	0,00	3,92		77	0,76	-0,868
00:28:48	0,00	3,94		77	0,77	-0,877
00:28:56	0,00	3,96		77	0,77	-0,886
00:29:05	0,00	3,98		77	0,77	-0,896
00:29:13	0,00	4,00		78	0,77	-0,905
00:29:21	0,00	4,02		78	0,78	-0,914
00:29:29	0,00	4,04		78	0,78	-0,923
00:29:38	0,00	4,06		78	0,78	-0,932
00:29:46	0,00	4,07		79	0,78	-0,941
00:29:54	0,00	4,09		79	0,78	-0,950
00:30:02	0,00	4,11		79	0,79	-0,960
00:30:11	0,00	4,13		79	0,79	-0,969
00:30:19	0,00	4,15		80	0,79	-0,977
00:30:27	0,00	4,17		80	0,79	-0,987
00:30:35	0,00	4,19		80	0,79	-0,995
00:30:43	0,00	4,21		80	0,80	-1,004

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:30:52	0,00	4,23		81	0,80	-1,013
00:31:00	0,00	4,24		81	0,80	-1,022
00:31:08	0,00	4,26		81	0,80	-1,031
00:31:16	0,00	4,28		81	0,81	-1,040
00:31:24	0,00	4,30		82	0,81	-1,048
00:31:32	0,00	4,32		82	0,81	-1,057
00:31:41	0,00	4,34		82	0,81	-1,066
00:31:49	0,00	4,36		82	0,81	-1,075
00:31:57	0,00	4,37		83	0,82	-1,083
00:32:05	0,00	4,39		83	0,82	-1,092
00:32:13	0,00	4,41		83	0,82	-1,100
00:32:21	0,00	4,43		83	0,82	-1,109
00:32:29	0,00	4,45		83	0,83	-1,118
00:32:37	0,00	4,47		84	0,83	-1,126
00:32:45	0,00	4,48		84	0,83	-1,135
00:32:54	0,00	4,50		84	0,83	-1,143
00:33:02	0,00	4,52		84	0,83	-1,152
00:33:10	0,00	4,54		85	0,84	-1,160
00:33:18	0,00	4,56		85	0,84	-1,169
00:33:26	0,00	4,58		85	0,84	-1,177
00:33:34	0,00	4,59		85	0,84	-1,185
00:33:42	0,00	4,61		86	0,85	-1,194
00:33:50	0,00	4,63		86	0,85	-1,202
00:33:58	0,00	4,65		86	0,85	-1,210
00:34:06	0,00	4,67		86	0,85	-1,219
00:34:14	0,00	4,68		87	0,85	-1,227
00:34:22	0,00	4,70		87	0,86	-1,235
00:34:30	0,00	4,72		87	0,86	-1,243
00:34:38	0,00	4,74		87	0,86	-1,251
00:34:46	0,00	4,76		87	0,86	-1,259
00:34:54	0,00	4,77		88	0,87	-1,268
00:35:02	0,00	4,79		88	0,87	-1,276
00:35:10	0,00	4,81		88	0,87	-1,284
00:35:18	0,00	4,83		88	0,87	-1,292
00:35:26	0,00	4,85		89	0,87	-1,300
00:35:34	0,00	4,86		89	0,88	-1,308
00:35:42	0,00	4,88		89	0,88	-1,316
00:35:50	0,00	4,90		89	0,88	-1,324
00:35:58	0,00	4,92		90	0,88	-1,332
00:36:06	0,00	4,93		90	0,89	-1,340
00:36:14	0,00	4,95		90	0,89	-1,348
00:36:22	0,00	4,97		90	0,89	-1,355
00:36:30	0,00	4,99		90	0,89	-1,364
00:36:38	0,00	5,00		91	0,89	-1,371
00:36:45	0,00	5,02		91	0,90	-1,379
00:36:53	0,00	5,04		91	0,90	-1,387
00:37:01	0,00	5,06		91	0,90	-1,395
00:37:09	0,00	5,07		92	0,90	-1,402
00:37:17	0,00	5,09		92	0,91	-1,410
00:37:25	0,00	5,11		92	0,91	-1,418
00:37:33	0,00	5,13		92	0,91	-1,425
00:37:41	0,00	5,14		92	0,91	-1,433
00:37:49	0,00	5,16		93	0,91	-1,441
00:37:56	0,00	5,18		93	0,92	-1,448
00:38:04	0,00	5,20		93	0,92	-1,456
00:38:12	0,00	5,21		93	0,92	-1,464

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:38:20	0,00	5,23		94	0,92	-1,471
00:38:28	0,00	5,25		94	0,93	-1,479
00:38:36	0,00	5,27		94	0,93	-1,486
00:38:43	0,00	5,28		94	0,93	-1,494
00:38:51	0,00	5,30		95	0,93	-1,501
00:38:59	0,00	5,32		95	0,93	-1,509
00:39:07	0,00	5,33		95	0,94	-1,516
00:39:15	0,00	5,35		95	0,94	-1,524
00:39:22	0,00	5,37		95	0,94	-1,531
00:39:30	0,00	5,39		96	0,94	-1,538
00:39:38	0,00	5,40		96	0,95	-1,546
00:39:46	0,00	5,42		96	0,95	-1,553
00:39:53	0,00	5,44		96	0,95	-1,560
00:40:00	0,00	5,45		96	0,95	-1,568
00:40:00	Fire brigade is alarmed					
00:40:07	0,00	5,47		97	0,95	-1,573
00:40:15	0,00	5,48		97	0,96	-1,580
00:40:23	0,00	5,50		97	0,96	-1,588
00:40:31	0,00	5,52		97	0,96	-1,595
00:40:38	0,00	5,53		98	0,96	-1,602
00:40:46	0,00	5,55		98	0,97	-1,609
00:40:54	0,00	5,57		98	0,97	-1,616
00:41:01	0,00	5,58		98	0,97	-1,623
00:41:09	0,00	5,60		98	0,97	-1,630
00:41:17	0,00	5,62		99	0,97	-1,638
00:41:24	0,00	5,63		99	0,98	-1,645
00:41:32	0,00	5,65		99	0,98	-1,652
00:41:40	0,00	5,67		99	0,98	-1,659
00:41:48	0,00	5,68		99	0,98	-1,666
00:41:55	0,00	5,70		100	0,99	-1,673
00:42:03	0,00	5,72		100	0,99	-1,680
00:42:11	0,00	5,73		100	0,99	-1,686
00:42:18	0,00	5,75		100	0,99	-1,693
00:42:26	0,00	5,77		101	1,00	-1,700
00:42:34	0,00	5,78		101	1,00	-1,707
00:42:41	0,00	5,80		101	1,00	-1,714
00:42:49	0,00	5,82		101	1,00	-1,721
00:42:57	0,00	5,83		101	1,00	-1,728
00:43:04	0,00	5,85		102	1,01	-1,735
00:43:12	0,00	5,87		102	1,01	-1,741
00:43:19	0,00	5,88		102	1,01	-1,748
00:43:27	0,00	5,90		102	1,01	-1,755
00:43:35	0,00	5,92		102	1,02	-1,762
00:43:42	0,00	5,93		103	1,02	-1,768
00:43:50	0,00	5,95		103	1,02	-1,775
00:43:58	0,00	5,97		103	1,02	-1,782
00:44:05	0,00	5,98		103	1,02	-1,788
00:44:13	0,00	6,00		104	1,03	-1,795
00:44:20	0,00	6,01		104	1,03	-1,801
00:44:28	0,00	6,03		104	1,03	-1,808
00:44:36	0,00	6,05		104	1,03	-1,815
00:44:43	0,00	6,06		104	1,04	-1,821
00:44:51	0,00	6,08		105	1,04	-1,828
00:44:58	0,00	6,10		105	1,04	-1,834
00:45:06	0,00	6,11		105	1,04	-1,841
00:45:13	0,00	6,13		105	1,05	-1,847

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:45:21	0,00	6,14		105	1,05	-1,853
00:45:29	0,00	6,16		106	1,05	-1,860
00:45:36	0,00	6,18		106	1,05	-1,866
00:45:43	0,00	6,19		106	1,05	-1,873
00:45:51	0,00	6,21		106	1,06	-1,879
00:45:58	0,00	6,22		106	1,06	-1,885
00:46:06	0,00	6,24		107	1,06	-1,892
00:46:14	0,00	6,26		107	1,06	-1,898
00:46:21	0,00	6,27		107	1,07	-1,904
00:46:29	0,00	6,29		107	1,07	-1,910
00:46:36	0,00	6,30		107	1,07	-1,917
00:46:44	0,00	6,32		108	1,07	-1,923
00:46:51	0,00	6,34		108	1,08	-1,929
00:46:59	0,00	6,35		108	1,08	-1,935
00:47:06	0,00	6,37		108	1,08	-1,941
00:47:13	0,00	6,38		108	1,08	-1,947
00:47:21	0,00	6,40		109	1,08	-1,954
00:47:28	0,00	6,41		109	1,09	-1,959
00:47:36	0,00	6,43		109	1,09	-1,965
00:47:43	0,00	6,45		109	1,09	-1,972
00:47:51	0,00	6,46		109	1,09	-1,977
00:47:58	0,00	6,48		110	1,10	-1,983
00:48:06	0,00	6,49		110	1,10	-1,989
00:48:13	0,00	6,51		110	1,10	-1,995
00:48:21	0,00	6,52		110	1,10	-2,001
00:48:28	0,00	6,54		110	1,11	-2,007
00:48:35	0,00	6,56		111	1,11	-2,013
00:48:43	0,00	6,57		111	1,11	-2,019
00:48:50	0,00	6,59		111	1,11	-2,025
00:48:58	0,00	6,60		111	1,11	-2,030
00:49:05	0,00	6,62		111	1,12	-2,036
00:49:13	0,00	6,63		112	1,12	-2,042
00:49:20	0,00	6,65		112	1,12	-2,047
00:49:27	0,00	6,66		112	1,12	-2,053
00:49:35	0,00	6,68		112	1,13	-2,058
00:49:42	0,00	6,70		112	1,13	-2,063
00:49:49	0,00	6,71		113	1,13	-2,069
00:49:57	0,00	6,73		113	1,13	-2,074
00:50:04	0,00	6,74		113	1,14	-2,079
00:50:11	0,00	6,76		113	1,14	-2,085
00:50:19	0,00	6,77		113	1,14	-2,090
00:50:26	0,00	6,79		114	1,14	-2,095
00:50:33	0,00	6,80		114	1,14	-2,100
00:50:41	0,00	6,82		114	1,15	-2,105
00:50:48	0,00	6,83		114	1,15	-2,111
00:50:55	0,00	6,85		114	1,15	-2,116
00:51:03	0,00	6,86		115	1,15	-2,121
00:51:10	0,00	6,88		115	1,16	-2,126
00:51:17	0,00	6,90		115	1,16	-2,131
00:51:25	0,00	6,91		115	1,16	-2,136
00:51:32	0,00	6,93		115	1,16	-2,141
00:51:39	0,00	6,94		116	1,17	-2,146
00:51:47	0,00	6,96		116	1,17	-2,151
00:51:54	0,00	6,97		116	1,17	-2,156
00:52:01	0,00	6,99		116	1,17	-2,161
00:52:09	0,00	7,00		116	1,18	-2,166

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:52:16	0,00	7,02		117	1,18	-2,171
00:52:23	0,00	7,03		117	1,18	-2,176
00:52:30	0,00	7,05		117	1,18	-2,181
00:52:38	0,00	7,06		117	1,18	-2,186
00:52:45	0,00	7,08		117	1,19	-2,191
00:52:52	0,00	7,09		118	1,19	-2,196
00:53:00	0,00	7,11		118	1,19	-2,201
00:53:07	0,00	7,12		118	1,19	-2,206
00:53:14	0,00	7,14		118	1,20	-2,211
00:53:21	0,00	7,15		118	1,20	-2,215
00:53:28	0,00	7,17		119	1,20	-2,220
00:53:36	0,00	7,18		119	1,20	-2,225
00:53:43	0,00	7,20		119	1,21	-2,230
00:53:50	0,00	7,21		119	1,21	-2,235
00:53:57	0,00	7,23		119	1,21	-2,240
00:54:05	0,00	7,24		119	1,21	-2,244
00:54:12	0,00	7,26		120	1,21	-2,249
00:54:19	0,00	7,27		120	1,22	-2,254
00:54:26	0,00	7,29		120	1,22	-2,259
00:54:33	0,00	7,30		120	1,22	-2,263
00:54:41	0,00	7,31		120	1,22	-2,268
00:54:48	0,00	7,33		121	1,23	-2,273
00:54:55	0,00	7,34		121	1,23	-2,278
00:55:00	0,00	7,35		121	1,23	-2,282
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:07	0,00	7,37		121	1,23	-2,285
00:55:14	0,00	7,38		121	1,23	-2,290
00:55:21	0,00	7,40		121	1,24	-2,295
00:55:28	0,00	7,41		122	1,24	-2,300
00:55:35	0,00	7,43		122	1,24	-2,304
00:55:43	0,00	7,44		122	1,24	-2,309
00:55:50	0,00	7,46		122	1,25	-2,314
00:56:00	0,00	7,48		122	1,25	-2,320
00:56:00	Fire brigade ready, extinguishing started					
00:56:07	0,00	7,49		123	1,25	-2,325
00:56:14	0,00	7,51		123	1,25	-2,329
00:56:21	0,00	7,52		123	1,26	-2,334
00:56:30	0,00	7,54		123	1,26	-2,341
00:56:31	0,00	7,54		123	1,26	-2,392
00:56:31	Fire is declining					
00:56:41	0,00	7,56		123	1,26	-2,645
00:56:50	0,00	7,57		124	1,26	-2,871
00:57:00	0,00	7,59		124	1,26	-3,078
00:57:09	0,00	7,60		123	1,26	-3,268
00:57:19	0,00	7,61		123	1,26	-3,447
00:57:28	0,00	7,62		123	1,26	-3,614
00:57:38	0,00	7,62		123	1,26	-3,773
00:57:47	0,00	7,63		123	1,25	-3,923
00:57:57	0,00	7,63		122	1,25	-4,066
00:58:06	0,00	7,64		122	1,25	-4,203
00:58:16	0,00	7,64		122	1,24	-4,333
00:58:25	0,00	7,64		121	1,24	-4,458
00:58:35	0,00	7,64		121	1,23	-4,577
00:58:45	0,00	7,63		120	1,22	-4,682
00:58:54	0,00	7,62		120	1,21	-4,742
00:59:04	0,00	7,60		119	1,21	-4,814

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:59:13	0,00	7,59		118	1,20	-4,898
00:59:15	0,00	7,58		118	1,20	-4,915
00:59:15	Fire has been put out					

Calculation

Basic information

Client:	BWSC
Scenario name:	Part I
Consultant:	Rambøll
Reference no.:	
Company type:	Industry, chemical
Basic bldg. construction:	Brick-wall/concrete-roof
Last revision:	12-12-2018 14:27:23
Revision No.:	40

Calculation options

Post flash-over model enabled:	x
Time limit [min]:	60
Plumemodel:	Heskestad

Fire brigade

Fire brigade active:	-
City area:	-
24 hour:	-
Distance/fire station [km]:	10,0
Calculated response time [min]:	15
Time before manual alarm [min]:	40

Fire start

Fire start room:	Part I
Fire start, type:	Energy formula fire
Fire start, name:	11 MW Fast
Fire start, code:	-
Optical smoke potential [dB/m]:	100,0
Maximum Q(t) [MW]:	11,00
Parabolic growth [MW/min²]:	0,1692
Parabolic growth [kW/s²]:	0,0470
Linear growth [MW/min]:	0,0000
Constant fire [MW]:	0,0000
Initial fire [kW]:	0,00
Doubling time [min]:	0,00

Fire installations

	[-- In operation				--]		
Room name	AFV Heat	AFV Smoke	AFV Timer	Sprinkler	AFA Heat	AFA Smoke	Windload [m/s]
Part I	-	-	-	-	-	-	0,00
Part II	-	-	-	-	-	-	0,00

Events

Fire progression:
Energy formula fire > 11 MW Fast
Plumemodel > Heskestad
00:08:27 : Critical condition in room 'Part II': Smoke free height less than 4,00 m
00:08:57 : Critical condition in room 'Part I': Smoke free height less than 5,20 m
00:13:25 : Room 'Part II' is now filled with smoke
00:20:12 : Room 'Part I' is now filled with smoke
00:40:00 : Fire brigade is alarmed
00:49:49 : Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²
00:52:40 : Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²
00:55:00 : Fire brigade arrived, preparing extinguishing
00:56:00 : Fire brigade ready, extinguishing started
00:56:32 : Fire is declining
01:00:00 : MAX. CALCULATION TIME - CALCULATION ABORTED!

RHR and smoke layer temperature in all rooms

Time	Rate of heat release [kW]	[---------- Smoke layer temp. [ºC] ----------] Part I	Part II
00:00:00	0	20	20
00:00:09	4	20	20
00:00:19	18	20	20
00:00:28	39	20	20
00:00:37	68	20	20
00:00:47	105	20	20
00:00:56	151	20	20
00:01:06	206	20	20
00:01:15	269	20	20
00:01:25	340	20	20
00:01:34	419	20	20
00:01:43	505	20	20
00:01:52	600	22	20
00:02:01	699	22	20
00:02:11	815	22	20
00:02:21	935	22	20
00:02:30	1.058	22	20
00:02:39	1.201	23	20
00:02:49	1.349	23	20
00:02:58	1.500	23	20
00:03:07	1.656	23	20
00:03:17	1.830	24	20
00:03:27	2.020	24	20
00:03:37	2.218	24	20
00:03:47	2.424	25	23
00:03:56	2.634	25	23
00:04:06	2.859	25	24
00:04:16	3.094	26	24
00:04:25	3.325	26	24
00:04:35	3.579	27	25
00:04:45	3.838	27	25
00:04:55	4.105	28	25
00:05:04	4.372	28	25
00:05:14	4.646	29	25
00:05:23	4.924	29	26
00:05:33	5.231	30	26
00:05:43	5.541	30	26
00:05:52	5.857	31	27
00:06:02	6.176	32	27
00:06:11	6.500	32	28
00:06:21	6.853	33	28
00:06:31	7.211	33	29
00:06:41	7.574	34	29
00:06:51	7.941	35	30
00:07:00	8.312	35	30
00:07:09	8.687	36	31
00:07:19	9.094	37	31

00:07:29	9.506	38	32
00:07:39	9.922	38	33
00:07:49	10.343	39	33
00:07:58	10.768	40	34
00:08:08	11.000	41	35
00:08:17	11.000	41	35
00:08:27	11.000	42	36
00:08:27		Critical condition in room 'Part II': Smoke free height less than 4,00 m	
00:08:35	11.000	43	37
00:08:44	11.000	43	37
00:08:53	11.000	44	38
00:08:57	11.000	44	38
00:08:57		Critical condition in room 'Part I': Smoke free height less than 5,20 m	
00:09:07	11.000	45	39
00:09:17	11.000	46	40
00:09:26	11.000	46	40
00:09:36	11.000	47	41
00:09:44	11.000	48	42
00:09:53	11.000	48	42
00:10:01	11.000	49	43
00:10:10	11.000	49	44
00:10:19	11.000	50	44
00:10:28	11.000	51	45
00:10:37	11.000	51	45
00:10:46	11.000	52	46
00:10:55	11.000	52	47
00:11:05	11.000	53	47
00:11:12	11.000	54	48
00:11:20	11.000	54	48
00:11:29	11.000	55	49
00:11:37	11.000	55	49
00:11:47	11.000	56	50
00:11:54	11.000	56	50
00:12:01	11.000	57	51
00:12:08	11.000	57	51
00:12:16	11.000	58	52
00:12:24	11.000	59	53
00:12:33	11.000	59	53
00:12:42	11.000	60	54
00:12:52	11.000	60	54
00:12:57	11.000	61	55
00:13:02	11.000	61	55
00:13:07	11.000	62	55
00:13:13	11.000	62	56
00:13:19	11.000	62	56
00:13:25	11.000	63	57
00:13:25		Room 'Part II' is now filled with smoke	
00:13:31	11.000	63	57
00:13:37	11.000	64	57
00:13:43	11.000	64	58
00:13:49	11.000	64	58
00:13:57	11.000	65	59
00:14:05	11.000	66	59
00:14:10	11.000	66	60
00:14:15	11.000	66	60
00:14:24	11.000	67	61
00:14:32	11.000	68	61
00:14:42	11.000	68	62
00:14:51	11.000	69	62

00:14:59	11.000	69	63
00:15:09	11.000	70	64
00:15:18	11.000	71	64
00:15:26	11.000	71	65
00:15:35	11.000	72	65
00:15:44	11.000	73	66
00:15:53	11.000	73	67
00:16:02	11.000	74	67
00:16:11	11.000	74	68
00:16:19	11.000	75	68
00:16:28	11.000	76	69
00:16:37	11.000	76	70
00:16:45	11.000	77	70
00:16:54	11.000	77	71
00:17:03	11.000	78	71
00:17:11	11.000	78	72
00:17:20	11.000	79	72
00:17:29	11.000	80	73
00:17:37	11.000	80	74
00:17:46	11.000	81	74
00:17:54	11.000	81	75
00:18:03	11.000	82	75
00:18:11	11.000	82	76
00:18:20	11.000	83	76
00:18:28	11.000	84	77
00:18:36	11.000	84	77
00:18:45	11.000	85	78
00:18:53	11.000	85	79
00:19:01	11.000	86	79
00:19:10	11.000	86	80
00:19:18	11.000	87	80
00:19:26	11.000	88	81
00:19:35	11.000	88	81
00:19:43	11.000	89	82
00:19:51	11.000	89	82
00:20:00	11.000	90	83
00:20:08	11.000	90	83
00:20:12	11.000	91	84
00:20:12		Room 'Part I' is now filled with smoke	
00:20:20	11.000	91	84
00:20:28	11.000	92	85
00:20:36	11.000	92	85
00:20:45	11.000	93	86
00:20:53	11.000	93	86
00:21:01	11.000	94	87
00:21:09	11.000	94	87
00:21:17	11.000	95	88
00:21:25	11.000	95	88
00:21:33	11.000	96	89
00:21:41	11.000	96	89
00:21:49	11.000	97	90
00:21:57	11.000	97	90
00:22:05	11.000	98	91
00:22:13	11.000	98	91
00:22:21	11.000	99	92
00:22:29	11.000	99	92
00:22:37	11.000	100	93
00:22:45	11.000	100	93
00:22:53	11.000	101	94

00:23:01	11.000	102	94
00:23:09	11.000	102	95
00:23:16	11.000	103	95
00:23:24	11.000	103	96
00:23:32	11.000	104	96
00:23:40	11.000	104	97
00:23:48	11.000	105	97
00:23:56	11.000	105	98
00:24:03	11.000	106	98
00:24:11	11.000	106	99
00:24:19	11.000	107	99
00:24:27	11.000	107	100
00:24:35	11.000	108	100
00:24:42	11.000	108	101
00:24:50	11.000	109	101
00:24:58	11.000	109	102
00:25:05	11.000	110	102
00:25:13	11.000	110	103
00:25:21	11.000	110	103
00:25:28	11.000	111	104
00:25:36	11.000	111	104
00:25:44	11.000	112	105
00:25:51	11.000	112	105
00:25:59	11.000	113	106
00:26:07	11.000	113	106
00:26:14	11.000	114	107
00:26:22	11.000	114	107
00:26:29	11.000	115	107
00:26:37	11.000	115	108
00:26:44	11.000	116	108
00:26:52	11.000	116	109
00:26:59	11.000	117	109
00:27:07	11.000	117	110
00:27:14	11.000	118	110
00:27:22	11.000	118	111
00:27:29	11.000	119	111
00:27:37	11.000	119	112
00:27:44	11.000	120	112
00:27:52	11.000	120	113
00:27:59	11.000	121	113
00:28:07	11.000	121	113
00:28:14	11.000	121	114
00:28:21	11.000	122	114
00:28:29	11.000	122	115
00:28:36	11.000	123	115
00:28:44	11.000	123	116
00:28:51	11.000	124	116
00:28:58	11.000	124	117
00:29:06	11.000	125	117
00:29:13	11.000	125	118
00:29:20	11.000	126	118
00:29:28	11.000	126	118
00:29:35	11.000	126	119
00:29:42	11.000	127	119
00:29:49	11.000	127	120
00:29:57	11.000	128	120
00:30:04	11.000	128	121
00:30:11	11.000	129	121
00:30:18	11.000	129	121

00:30:26	11.000	130	122
00:30:33	11.000	130	122
00:30:40	11.000	131	123
00:30:47	11.000	131	123
00:30:54	11.000	131	124
00:31:01	11.000	132	124
00:31:09	11.000	132	125
00:31:16	11.000	133	125
00:31:23	11.000	133	125
00:31:30	11.000	134	126
00:31:37	11.000	134	126
00:31:44	11.000	134	127
00:31:52	11.000	135	127
00:31:59	11.000	135	128
00:32:06	11.000	136	128
00:32:13	11.000	136	128
00:32:20	11.000	137	129
00:32:27	11.000	137	129
00:32:34	11.000	138	130
00:32:41	11.000	138	130
00:32:48	11.000	138	130
00:32:55	11.000	139	131
00:33:02	11.000	139	131
00:33:09	11.000	140	132
00:33:16	11.000	140	132
00:33:23	11.000	141	133
00:33:30	11.000	141	133
00:33:37	11.000	141	133
00:33:44	11.000	142	134
00:33:51	11.000	142	134
00:33:58	11.000	143	135
00:34:04	11.000	143	135
00:34:11	11.000	143	135
00:34:18	11.000	144	136
00:34:25	11.000	144	136
00:34:32	11.000	145	137
00:34:39	11.000	145	137
00:34:46	11.000	146	138
00:34:53	11.000	146	138
00:34:59	11.000	146	138
00:35:06	11.000	147	139
00:35:13	11.000	147	139
00:35:20	11.000	148	140
00:35:27	11.000	148	140
00:35:34	11.000	148	140
00:35:40	11.000	149	141
00:35:47	11.000	149	141
00:35:54	11.000	150	142
00:36:01	11.000	150	142
00:36:07	11.000	150	142
00:36:14	11.000	151	143
00:36:21	11.000	151	143
00:36:28	11.000	152	144
00:36:34	11.000	152	144
00:36:41	11.000	152	144
00:36:48	11.000	153	145
00:36:54	11.000	153	145
00:37:01	11.000	154	145
00:37:08	11.000	154	146

00:37:18	11.000	155	146
00:37:25	11.000	155	147
00:37:34	11.000	156	147
00:37:44	11.000	156	148
00:37:54	11.000	157	149
00:38:04	11.000	157	149
00:38:14	11.000	158	150
00:38:24	11.000	159	150
00:38:34	11.000	159	151
00:38:44	11.000	160	151
00:38:54	11.000	160	152
00:39:03	11.000	161	153
00:39:13	11.000	161	153
00:39:23	11.000	162	154
00:39:33	11.000	163	154
00:39:43	11.000	163	155
00:39:52	11.000	164	155
00:40:00	11.000	164	156
00:40:00		Fire brigade is alarmed	
00:40:09	11.000	165	156
00:40:19	11.000	165	157
00:40:29	11.000	166	157
00:40:38	11.000	166	158
00:40:48	11.000	167	159
00:40:57	11.000	168	159
00:41:07	11.000	168	160
00:41:17	11.000	169	160
00:41:26	11.000	169	161
00:41:36	11.000	170	161
00:41:45	11.000	170	162
00:41:55	11.000	171	162
00:42:04	11.000	171	163
00:42:14	11.000	172	163
00:42:23	11.000	172	164
00:42:33	11.000	173	164
00:42:42	11.000	174	165
00:42:52	11.000	174	166
00:43:01	11.000	175	166
00:43:11	11.000	175	167
00:43:20	11.000	176	167
00:43:29	11.000	176	168
00:43:39	11.000	177	168
00:43:48	11.000	177	169
00:43:57	11.000	178	169
00:44:07	11.000	178	170
00:44:16	11.000	179	170
00:44:25	11.000	179	171
00:44:35	11.000	180	171
00:44:44	11.000	180	172
00:44:53	11.000	181	172
00:45:02	11.000	182	173
00:45:12	11.000	182	173
00:45:21	11.000	183	174
00:45:30	11.000	183	174
00:45:39	11.000	184	175
00:45:48	11.000	184	175
00:45:58	11.000	185	176
00:46:07	11.000	185	176
00:46:16	11.000	186	177

00:46:25	11.000	186	177
00:46:34	11.000	187	178
00:46:43	11.000	187	178
00:46:52	11.000	188	179
00:47:01	11.000	188	179
00:47:11	11.000	189	180
00:47:20	11.000	189	180
00:47:29	11.000	190	181
00:47:38	11.000	190	181
00:47:47	11.000	191	182
00:47:56	11.000	191	182
00:48:05	11.000	192	183
00:48:14	11.000	192	183
00:48:23	11.000	193	184
00:48:32	11.000	193	184
00:48:40	11.000	194	185
00:48:49	11.000	194	185
00:48:58	11.000	195	186
00:49:07	11.000	195	186
00:49:16	11.000	196	187
00:49:25	11.000	196	187
00:49:34	11.000	197	188
00:49:43	11.000	197	188
00:49:49	11.000	197	188
00:49:49		Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²	
00:49:57	11.000	198	189
00:50:06	11.000	198	189
00:50:15	11.000	199	190
00:50:24	11.000	199	190
00:50:33	11.000	200	191
00:50:41	11.000	200	191
00:50:50	11.000	201	192
00:50:59	11.000	201	192
00:51:08	11.000	202	193
00:51:16	11.000	202	193
00:51:25	11.000	203	193
00:51:34	11.000	203	194
00:51:43	11.000	204	194
00:51:51	11.000	204	195
00:52:00	11.000	204	195
00:52:08	11.000	205	196
00:52:17	11.000	205	196
00:52:26	11.000	206	197
00:52:35	11.000	206	197
00:52:40	11.000	207	197
00:52:40		Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²	
00:52:49	11.000	207	198
00:52:57	11.000	208	198
00:53:06	11.000	208	199
00:53:15	11.000	208	199
00:53:23	11.000	209	200
00:53:32	11.000	209	200
00:53:40	11.000	210	201
00:53:49	11.000	210	201
00:53:57	11.000	211	201
00:54:06	11.000	211	202
00:54:14	11.000	212	202

00:54:23	11.000	212	203
00:54:31	11.000	213	203
00:54:40	11.000	213	204
00:54:48	11.000	213	204
00:54:57	11.000	214	204
00:55:00	11.000	214	205
00:55:00		Fire brigade arrived, preparing extinguishing	
00:55:08	11.000	214	205
00:55:16	11.000	215	205
00:55:25	11.000	215	206
00:55:33	11.000	216	206
00:55:42	11.000	216	207
00:55:50	11.000	217	207
00:56:00	11.000	217	208
00:56:00		Fire brigade ready, extinguishing started	
00:56:08	11.000	218	208
00:56:16	11.000	218	209
00:56:25	11.000	218	209
00:56:32	10.906	219	209
00:56:32		Fire is declining	
00:56:42	10.587	219	210
00:56:51	10.269	220	210
00:57:01	9.950	220	211
00:57:11	9.632	220	211
00:57:20	9.313	220	211
00:57:30	8.995	221	212
00:57:39	8.676	221	212
00:57:49	8.357	221	212
00:57:58	8.039	221	212
00:58:08	7.720	221	213
00:58:17	7.402	221	213
00:58:27	7.083	221	213
00:58:37	6.765	221	213
00:58:46	6.446	221	213
00:58:56	6.128	221	213
00:59:05	5.809	220	213
00:59:15	5.491	220	213
00:59:24	5.172	220	213
00:59:34	4.854	220	213
00:59:43	4.535	219	213
00:59:53	4.216	219	213
01:00:00	4.000	219	212
01:00:00		MAX. CALCULATION TIME - CALCULATION ABORTED!	

Simulation results for each room

Part I

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:00:00	0,00		36,00	20		-0,010
00:00:09	0,00		36,00	20		0,000
00:00:19	0,00		36,00	20		0,000
00:00:28	0,00		36,00	20		0,000
00:00:37	0,00		36,00	20		0,000
00:00:47	0,00		36,00	20		0,000
00:00:56	0,00		36,00	20		0,000
00:01:06	0,00		36,00	20		0,000
00:01:15	0,00		36,00	20		0,000
00:01:25	0,01		36,00	20		0,000
00:01:34	0,01		36,00	20		0,000
00:01:43	0,01		36,00	20		0,000
00:01:52	0,01	0,11	35,27	22		0,077
00:02:01	0,01	0,12	33,92	22	0,09	0,104
00:02:11	0,01	0,13	32,46	22	0,10	0,141
00:02:21	0,01	0,14	31,09	22	0,10	0,184
00:02:30	0,01	0,15	29,80	22	0,11	0,234
00:02:39	0,01	0,16	28,43	23	0,12	0,300
00:02:49	0,01	0,17	27,14	23	0,12	0,376
00:02:58	0,01	0,19	25,93	23	0,13	0,463
00:03:07	0,01	0,20	24,79	23	0,14	0,561
00:03:17	0,01	0,22	23,62	24	0,15	0,675
00:03:27	0,01	0,24	22,50	24	0,16	0,748
00:03:37	0,01	0,26	21,55	24	0,17	0,791
00:03:47	0,01	0,28	20,78	25	0,18	1,110
00:03:56	0,01	0,30	20,16	25	0,18	1,301
00:04:06	0,01	0,32	19,65	25	0,19	1,520
00:04:16	0,01	0,35	19,22	26	0,20	1,766
00:04:25	0,01	0,37	18,85	26	0,20	2,026
00:04:35	0,01	0,40	18,46	27	0,21	2,334
00:04:45	0,01	0,42	18,04	27	0,21	2,673
00:04:55	0,01	0,45	17,56	28	0,22	3,046
00:05:04	0,01	0,48	17,06	28	0,23	3,441
00:05:14	0,01	0,51	16,55	29	0,23	3,870
00:05:23	0,01	0,54	16,05	29	0,24	4,328
00:05:33	0,01	0,57	15,52	30	0,25	4,859
00:05:43	0,01	0,61	14,99	30	0,26	5,426
00:05:52	0,01	0,64	14,46	31	0,27	6,031
00:06:02	0,01	0,67	13,94	32	0,28	6,674
00:06:11	0,01	0,71	13,43	32	0,29	7,355
00:06:21	0,01	0,74	12,88	33	0,30	8,133
00:06:31	0,01	0,78	12,34	33	0,31	8,956
00:06:41	0,01	0,82	11,82	34	0,32	9,826
00:06:51	0,01	0,85	11,30	35	0,33	10,743
00:07:00	0,01	0,89	10,80	35	0,34	11,708
00:07:09	0,01	0,93	10,30	36	0,35	12,720
00:07:19	0,01	0,97	9,78	37	0,37	13,859
00:07:29	0,01	1,01	9,28	38	0,38	15,053
00:07:39	0,01	1,06	8,78	38	0,39	16,303
00:07:49	0,01	1,10	8,30	39	0,40	17,610
00:07:58	0,01	1,15	7,83	40	0,41	18,973
00:08:08	0,01	1,19	7,37	41	0,43	19,507
00:08:17	0,01	1,24	6,92	41	0,44	19,020

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:27	0,01	1,28	6,48	42	0,45	18,558
00:08:27	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:08:35	0,01	1,32	6,12	43	0,46	18,188
00:08:44	0,01	1,35	5,75	43	0,47	17,819
00:08:53	0,01	1,39	5,38	44	0,48	17,453
00:08:57	0,01	1,41	5,19	44	0,48	17,272
00:08:57	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:09:07	0,01	1,45	4,82	45	0,49	16,914
00:09:17	0,01	1,50	4,45	46	0,50	16,564
00:09:26	0,01	1,53	4,13	46	0,51	16,233
00:09:36	0,01	1,58	3,80	47	0,51	15,822
00:09:44	0,01	1,61	3,54	48	0,52	15,479
00:09:53	0,01	1,65	3,29	48	0,53	15,132
00:10:01	0,01	1,68	3,04	49	0,53	14,786
00:10:10	0,01	1,72	2,80	49	0,54	14,440
00:10:19	0,01	1,76	2,58	50	0,54	14,098
00:10:28	0,01	1,80	2,36	51	0,55	13,759
00:10:37	0,01	1,84	2,15	51	0,56	13,424
00:10:46	0,01	1,88	1,95	52	0,56	13,073
00:10:55	0,00	1,92	1,76	52	0,57	12,684
00:11:05	0,00	1,96	1,59	53	0,57	12,289
00:11:12	0,00	1,99	1,46	54	0,58	11,986
00:11:20	0,00	2,03	1,33	54	0,58	11,676
00:11:29	0,00	2,07	1,20	55	0,59	11,357
00:11:37	0,00	2,11	1,08	55	0,59	11,028
00:11:47	0,00	2,15	0,97	56	0,60	10,690
00:11:54	0,00	2,18	0,89	56	0,60	10,459
00:12:01	0,00	2,21	0,82	57	0,60	10,223
00:12:08	0,00	2,25	0,74	57	0,61	9,984
00:12:16	0,00	2,29	0,68	58	0,61	9,742
00:12:24	0,00	2,32	0,61	59	0,62	9,497
00:12:33	0,00	2,36	0,55	59	0,62	9,250
00:12:42	0,00	2,41	0,49	60	0,63	9,000
00:12:52	0,00	2,45	0,44	60	0,63	8,749
00:12:57	0,00	2,48	0,41	61	0,63	8,622
00:13:02	0,00	2,50	0,39	61	0,64	8,495
00:13:07	0,00	2,53	0,36	62	0,64	8,367
00:13:13	0,00	2,55	0,34	62	0,64	8,239
00:13:19	0,00	2,58	0,32	62	0,65	8,107
00:13:25	0,00	2,61	0,30	63	0,65	7,974
00:13:25	Room 'Part II' is now filled with smoke					
00:13:31	0,00	2,64	0,28	63	0,65	7,842
00:13:37	0,00	2,67	0,26	64	0,66	7,722
00:13:43	0,00	2,69	0,24	64	0,66	7,597
00:13:49	0,00	2,72	0,23	64	0,66	7,489
00:13:57	0,00	2,76	0,20	65	0,67	7,330
00:14:05	0,00	2,80	0,19	66	0,67	7,186
00:14:10	0,00	2,82	0,18	66	0,67	7,099
00:14:15	0,00	2,85	0,17	66	0,68	7,007
00:14:24	0,00	2,89	0,15	67	0,68	6,853
00:14:32	0,00	2,93	0,14	68	0,69	6,724
00:14:42	0,00	2,97	0,12	68	0,69	6,572
00:14:51	0,00	3,02	0,11	69	0,70	6,432
00:14:59	0,00	3,05	0,10	69	0,70	6,313
00:15:09	0,00	3,10	0,09	70	0,71	6,180
00:15:18	0,00	3,14	0,08	71	0,71	6,055

Part I

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:15:26	0,00	3,18	0,08	71	0,72	5,945
00:15:35	0,00	3,22	0,07	72	0,72	5,827
00:15:44	0,00	3,27	0,06	73	0,73	5,713
00:15:53	0,00	3,31	0,06	73	0,73	5,611
00:16:02	0,00	3,35	0,05	74	0,74	5,505
00:16:11	0,00	3,39	0,05	74	0,74	5,400
00:16:19	0,00	3,43	0,04	75	0,75	5,306
00:16:28	0,00	3,47	0,04	76	0,75	5,210
00:16:37	0,00	3,51	0,04	76	0,76	5,113
00:16:45	0,00	3,55	0,03	77	0,76	5,026
00:16:54	0,00	3,59	0,03	77	0,77	4,938
00:17:03	0,00	3,63	0,03	78	0,78	4,848
00:17:11	0,00	3,67	0,02	78	0,78	4,767
00:17:20	0,00	3,71	0,02	79	0,79	4,685
00:17:29	0,00	3,75	0,02	80	0,79	4,602
00:17:37	0,00	3,79	0,02	80	0,80	4,526
00:17:46	0,00	3,83	0,02	81	0,80	4,449
00:17:54	0,00	3,87	0,01	81	0,81	4,372
00:18:03	0,00	3,91	0,01	82	0,81	4,301
00:18:11	0,00	3,95	0,01	82	0,82	4,229
00:18:20	0,00	3,99	0,01	83	0,82	4,157
00:18:28	0,00	4,03	0,01	84	0,83	4,089
00:18:36	0,00	4,07	0,01	84	0,83	4,022
00:18:45	0,00	4,11	0,01	85	0,84	3,954
00:18:53	0,00	4,14	0,01	85	0,84	3,890
00:19:01	0,00	4,18	0,01	86	0,85	3,826
00:19:10	0,00	4,22	0,01	86	0,85	3,761
00:19:18	0,00	4,26		87	0,86	3,700
00:19:26	0,00	4,30		88	0,86	3,640
00:19:35	0,00	4,33		88	0,87	3,579
00:19:43	0,00	4,37		89	0,87	3,521
00:19:51	0,00	4,41		89	0,88	3,463
00:20:00	0,00	4,45		90	0,88	3,405
00:20:08	0,00	4,48		90	0,89	3,349
00:20:12	0,00	4,50		91	0,89	3,320
00:20:12	Room 'Part I' is now filled with smoke					
00:20:20	0,00	4,54		91	0,90	3,265
00:20:28	0,00	4,58		92	0,90	3,212
00:20:36	0,00	4,61		92	0,91	3,160
00:20:45	0,00	4,65		93	0,91	3,108
00:20:53	0,00	4,69		93	0,92	3,057
00:21:01	0,00	4,72		94	0,92	3,007
00:21:09	0,00	4,76		94	0,93	2,957
00:21:17	0,00	4,80		95	0,94	2,907
00:21:25	0,00	4,83		95	0,94	2,859
00:21:33	0,00	4,87		96	0,95	2,811
00:21:41	0,00	4,91		96	0,95	2,763
00:21:49	0,00	4,94		97	0,96	2,717
00:21:57	0,00	4,98		97	0,96	2,670
00:22:05	0,00	5,01		98	0,97	2,624
00:22:13	0,00	5,05		98	0,97	2,579
00:22:21	0,00	5,09		99	0,98	2,535
00:22:29	0,00	5,12		99	0,98	2,490
00:22:37	0,00	5,16		100	0,99	2,446
00:22:45	0,00	5,19		100	0,99	2,403
00:22:53	0,00	5,23		101	1,00	2,360

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:01	0,00	5,26		102	1,01	2,318
00:23:09	0,00	5,30		102	1,01	2,276
00:23:16	0,00	5,33		103	1,02	2,234
00:23:24	0,00	5,37		103	1,02	2,193
00:23:32	0,00	5,40		104	1,03	2,152
00:23:40	0,00	5,44		104	1,03	2,112
00:23:48	0,00	5,47		105	1,04	2,072
00:23:56	0,00	5,51		105	1,04	2,032
00:24:03	0,00	5,54		106	1,05	1,993
00:24:11	0,00	5,58		106	1,06	1,954
00:24:19	0,00	5,61		107	1,06	1,916
00:24:27	0,00	5,64		107	1,07	1,878
00:24:35	0,00	5,68		108	1,07	1,840
00:24:42	0,00	5,71		108	1,08	1,803
00:24:50	0,00	5,75		109	1,08	1,766
00:24:58	0,00	5,78		109	1,09	1,730
00:25:05	0,00	5,81		110	1,09	1,693
00:25:13	0,00	5,85		110	1,10	1,657
00:25:21	0,00	5,88		110	1,11	1,622
00:25:28	0,00	5,92		111	1,11	1,587
00:25:36	0,00	5,95		111	1,12	1,551
00:25:44	0,00	5,98		112	1,12	1,517
00:25:51	0,00	6,02		112	1,13	1,483
00:25:59	0,00	6,05		113	1,13	1,449
00:26:07	0,00	6,08		113	1,14	1,415
00:26:14	0,00	6,12		114	1,14	1,382
00:26:22	0,00	6,15		114	1,15	1,348
00:26:29	0,00	6,18		115	1,16	1,315
00:26:37	0,00	6,21		115	1,16	1,283
00:26:44	0,00	6,25		116	1,17	1,251
00:26:52	0,00	6,28		116	1,17	1,219
00:26:59	0,00	6,31		117	1,18	1,187
00:27:07	0,00	6,34		117	1,18	1,156
00:27:14	0,00	6,38		118	1,19	1,124
00:27:22	0,00	6,41		118	1,20	1,094
00:27:29	0,00	6,44		119	1,20	1,063
00:27:37	0,00	6,47		119	1,21	1,033
00:27:44	0,00	6,51		120	1,21	1,003
00:27:52	0,00	6,54		120	1,22	0,973
00:27:59	0,00	6,57		121	1,23	0,943
00:28:07	0,00	6,60		121	1,23	0,914
00:28:14	0,00	6,63		121	1,24	0,884
00:28:21	0,00	6,67		122	1,24	0,856
00:28:29	0,00	6,70		122	1,25	0,827
00:28:36	0,00	6,73		123	1,25	0,798
00:28:44	0,00	6,76		123	1,26	0,770
00:28:51	0,00	6,79		124	1,27	0,742
00:28:58	0,00	6,83		124	1,27	0,714
00:29:06	0,00	6,86		125	1,28	0,687
00:29:13	0,00	6,89		125	1,28	0,659
00:29:20	0,00	6,92		126	1,29	0,632
00:29:28	0,00	6,95		126	1,30	0,606
00:29:35	0,00	6,98		126	1,30	0,579
00:29:42	0,00	7,01		127	1,31	0,552
00:29:49	0,00	7,04		127	1,31	0,527
00:29:57	0,00	7,07		128	1,32	0,501

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:30:04	0,00	7,11		128	1,33	0,474
00:30:11	0,00	7,14		129	1,33	0,449
00:30:18	0,00	7,17		129	1,34	0,424
00:30:26	0,00	7,20		130	1,34	0,398
00:30:33	0,00	7,23		130	1,35	0,374
00:30:40	0,00	7,26		131	1,35	0,349
00:30:47	0,00	7,29		131	1,36	0,324
00:30:54	0,00	7,32		131	1,37	0,300
00:31:01	0,00	7,35		132	1,37	0,277
00:31:09	0,00	7,38		132	1,38	0,252
00:31:16	0,00	7,41		133	1,38	0,229
00:31:23	0,00	7,44		133	1,39	0,206
00:31:30	0,00	7,47		134	1,40	0,183
00:31:37	0,00	7,50		134	1,40	0,160
00:31:44	0,00	7,53		134	1,41	0,137
00:31:52	0,00	7,56		135	1,42	0,115
00:31:59	0,00	7,59		135	1,42	0,093
00:32:06	0,00	7,62		136	1,43	0,071
00:32:13	0,00	7,65		136	1,43	0,049
00:32:20	0,00	7,68		137	1,44	0,028
00:32:27	0,00	7,71		137	1,45	0,008
00:32:34	0,00	7,74		138	1,45	-0,013
00:32:41	0,00	7,77		138	1,46	-0,032
00:32:48	0,00	7,80		138	1,46	-0,051
00:32:55	0,00	7,83		139	1,47	-0,070
00:33:02	0,00	7,86		139	1,48	-0,089
00:33:09	0,00	7,89		140	1,48	-0,107
00:33:16	0,00	7,92		140	1,49	-0,126
00:33:23	0,00	7,94		141	1,49	-0,144
00:33:30	0,00	7,97		141	1,50	-0,162
00:33:37	0,00	8,00		141	1,51	-0,180
00:33:44	0,00	8,03		142	1,51	-0,198
00:33:51	0,00	8,06		142	1,52	-0,215
00:33:58	0,00	8,09		143	1,52	-0,233
00:34:04	0,00	8,12		143	1,53	-0,251
00:34:11	0,00	8,15		143	1,54	-0,268
00:34:18	0,00	8,18		144	1,54	-0,285
00:34:25	0,00	8,20		144	1,55	-0,302
00:34:32	0,00	8,23		145	1,56	-0,319
00:34:39	0,00	8,26		145	1,56	-0,336
00:34:46	0,00	8,29		146	1,57	-0,353
00:34:53	0,00	8,32		146	1,57	-0,370
00:34:59	0,00	8,35		146	1,58	-0,386
00:35:06	0,00	8,38		147	1,59	-0,403
00:35:13	0,00	8,40		147	1,59	-0,419
00:35:20	0,00	8,43		148	1,60	-0,435
00:35:27	0,00	8,46		148	1,61	-0,452
00:35:34	0,00	8,49		148	1,61	-0,468
00:35:40	0,00	8,52		149	1,62	-0,484
00:35:47	0,00	8,54		149	1,62	-0,500
00:35:54	0,00	8,57		150	1,63	-0,516
00:36:01	0,00	8,60		150	1,64	-0,531
00:36:07	0,00	8,63		150	1,64	-0,547
00:36:14	0,00	8,66		151	1,65	-0,563
00:36:21	0,00	8,68		151	1,66	-0,578
00:36:28	0,00	8,71		152	1,66	-0,594

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:36:34	0,00	8,74		152	1,67	-0,609
00:36:41	0,00	8,77		152	1,67	-0,624
00:36:48	0,00	8,79		153	1,68	-0,640
00:36:54	0,00	8,82		153	1,69	-0,655
00:37:01	0,00	8,85		154	1,69	-0,670
00:37:08	0,00	8,88		154	1,70	-0,685
00:37:18	0,00	8,92		155	1,71	-0,707
00:37:25	0,00	8,94		155	1,72	-0,722
00:37:34	0,00	8,98		156	1,72	-0,744
00:37:44	0,00	9,03		156	1,73	-0,766
00:37:54	0,00	9,07		157	1,74	-0,788
00:38:04	0,00	9,11		157	1,75	-0,809
00:38:14	0,00	9,15		158	1,76	-0,831
00:38:24	0,00	9,19		159	1,77	-0,852
00:38:34	0,00	9,23		159	1,78	-0,873
00:38:44	0,00	9,27		160	1,79	-0,894
00:38:54	0,00	9,31		160	1,80	-0,915
00:39:03	0,00	9,35		161	1,81	-0,936
00:39:13	0,00	9,39		161	1,82	-0,956
00:39:23	0,00	9,43		162	1,83	-0,977
00:39:33	0,00	9,47		163	1,84	-0,997
00:39:43	0,00	9,51		163	1,85	-1,017
00:39:52	0,00	9,54		164	1,86	-1,037
00:40:00	0,00	9,57		164	1,87	-1,057
00:40:00	Fire brigade is alarmed					
00:40:09	0,00	9,61		165	1,88	-1,071
00:40:19	0,00	9,65		165	1,89	-1,091
00:40:29	0,00	9,69		166	1,90	-1,111
00:40:38	0,00	9,73		166	1,91	-1,130
00:40:48	0,00	9,77		167	1,91	-1,149
00:40:57	0,00	9,81		168	1,92	-1,168
00:41:07	0,00	9,84		168	1,93	-1,187
00:41:17	0,00	9,88		169	1,94	-1,206
00:41:26	0,00	9,92		169	1,95	-1,225
00:41:36	0,00	9,96		170	1,96	-1,243
00:41:45	0,00	10,00		170	1,97	-1,262
00:41:55	0,00	10,04		171	1,98	-1,280
00:42:04	0,00	10,07		171	1,99	-1,298
00:42:14	0,00	10,11		172	2,00	-1,317
00:42:23	0,00	10,15		172	2,01	-1,335
00:42:33	0,00	10,19		173	2,02	-1,352
00:42:42	0,00	10,22		174	2,03	-1,370
00:42:52	0,00	10,26		174	2,04	-1,388
00:43:01	0,00	10,30		175	2,05	-1,405
00:43:11	0,00	10,34		175	2,06	-1,423
00:43:20	0,00	10,37		176	2,07	-1,440
00:43:29	0,00	10,41		176	2,08	-1,457
00:43:39	0,00	10,45		177	2,09	-1,474
00:43:48	0,00	10,49		177	2,10	-1,491
00:43:57	0,00	10,52		178	2,11	-1,508
00:44:07	0,00	10,56		178	2,12	-1,524
00:44:16	0,00	10,60		179	2,13	-1,541
00:44:25	0,00	10,63		179	2,14	-1,557
00:44:35	0,00	10,67		180	2,15	-1,574
00:44:44	0,00	10,71		180	2,16	-1,590
00:44:53	0,00	10,74		181	2,17	-1,606

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:45:02	0,00	10,78		182	2,18	-1,622
00:45:12	0,00	10,81		182	2,19	-1,638
00:45:21	0,00	10,85		183	2,20	-1,654
00:45:30	0,00	10,89		183	2,21	-1,669
00:45:39	0,00	10,92		184	2,22	-1,685
00:45:48	0,00	10,96		184	2,23	-1,700
00:45:58	0,00	10,99		185	2,24	-1,715
00:46:07	0,00	11,03		185	2,25	-1,730
00:46:16	0,00	11,07		186	2,26	-1,745
00:46:25	0,00	11,10		186	2,27	-1,759
00:46:34	0,00	11,14		187	2,28	-1,773
00:46:43	0,00	11,17		187	2,29	-1,787
00:46:52	0,00	11,21		188	2,30	-1,801
00:47:01	0,00	11,24		188	2,31	-1,815
00:47:11	0,00	11,28		189	2,32	-1,828
00:47:20	0,00	11,31		189	2,33	-1,842
00:47:29	0,00	11,35		190	2,34	-1,855
00:47:38	0,00	11,38		190	2,35	-1,869
00:47:47	0,00	11,42		191	2,36	-1,882
00:47:56	0,00	11,45		191	2,37	-1,895
00:48:05	0,00	11,49		192	2,38	-1,908
00:48:14	0,00	11,52		192	2,39	-1,921
00:48:23	0,00	11,56		193	2,40	-1,934
00:48:32	0,00	11,59		193	2,41	-1,947
00:48:40	0,00	11,62		194	2,42	-1,960
00:48:49	0,00	11,66		194	2,43	-1,972
00:48:58	0,00	11,69		195	2,44	-1,985
00:49:07	0,00	11,73		195	2,45	-1,997
00:49:16	0,00	11,76		196	2,46	-2,010
00:49:25	0,00	11,80		196	2,47	-2,022
00:49:34	0,00	11,83		197	2,48	-2,035
00:49:43	0,00	11,86		197	2,49	-2,047
00:49:49	0,00	11,89		197	2,50	-2,055
00:49:49	Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:49:57	0,00	11,92		198	2,51	-2,067
00:50:06	0,00	11,95		198	2,52	-2,080
00:50:15	0,00	11,99		199	2,53	-2,092
00:50:24	0,00	12,02		199	2,54	-2,104
00:50:33	0,00	12,05		200	2,55	-2,116
00:50:41	0,00	12,09		200	2,56	-2,127
00:50:50	0,00	12,12		201	2,57	-2,139
00:50:59	0,00	12,15		201	2,58	-2,151
00:51:08	0,00	12,19		202	2,59	-2,163
00:51:16	0,00	12,22		202	2,60	-2,174
00:51:25	0,00	12,25		203	2,61	-2,186
00:51:34	0,00	12,29		203	2,62	-2,197
00:51:43	0,00	12,32		204	2,64	-2,209
00:51:51	0,00	12,35		204	2,65	-2,220
00:52:00	0,00	12,39		204	2,66	-2,232
00:52:08	0,00	12,42		205	2,67	-2,243
00:52:17	0,00	12,45		205	2,68	-2,254
00:52:26	0,00	12,48		206	2,69	-2,266
00:52:35	0,00	12,52		206	2,70	-2,277
00:52:40	0,00	12,54		207	2,70	-2,284
00:52:40						

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
	Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:52:49	0,00	12,57		207	2,71	-2,295
00:52:57	0,00	12,60		208	2,72	-2,306
00:53:06	0,00	12,63		208	2,74	-2,317
00:53:15	0,00	12,67		208	2,75	-2,328
00:53:23	0,00	12,70		209	2,76	-2,339
00:53:32	0,00	12,73		209	2,77	-2,350
00:53:40	0,00	12,76		210	2,78	-2,361
00:53:49	0,00	12,79		210	2,79	-2,372
00:53:57	0,00	12,83		211	2,80	-2,382
00:54:06	0,00	12,86		211	2,81	-2,393
00:54:14	0,00	12,89		212	2,82	-2,404
00:54:23	0,00	12,92		212	2,83	-2,414
00:54:31	0,00	12,95		213	2,84	-2,425
00:54:40	0,00	12,99		213	2,85	-2,435
00:54:48	0,00	13,02		213	2,86	-2,446
00:54:57	0,00	13,05		214	2,87	-2,456
00:55:00	0,00	13,06		214	2,87	-2,459
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:08	0,00	13,09		214	2,88	-2,470
00:55:16	0,00	13,12		215	2,89	-2,480
00:55:25	0,00	13,15		215	2,91	-2,490
00:55:33	0,00	13,18		216	2,92	-2,500
00:55:42	0,00	13,21		216	2,93	-2,511
00:55:50	0,00	13,25		217	2,94	-2,521
00:56:00	0,00	13,28		217	2,95	-2,534
00:56:00	Fire brigade ready, extinguishing started					
00:56:08	0,00	13,31		218	2,96	-2,542
00:56:16	0,00	13,34		218	2,97	-2,552
00:56:25	0,00	13,37		218	2,98	-2,562
00:56:32	0,00	13,40		219	2,99	-2,663
00:56:32	Fire is declining					
00:56:42	0,00	13,44		219	3,00	-2,960
00:56:51	0,00	13,47		220	3,01	-3,230
00:57:01	0,00	13,50		220	3,02	-3,477
00:57:11	0,00	13,54		220	3,02	-3,704
00:57:20	0,00	13,57		220	3,03	-3,914
00:57:30	0,00	13,60		221	3,03	-4,111
00:57:39	0,00	13,63		221	3,04	-4,295
00:57:49	0,00	13,66		221	3,04	-4,468
00:57:58	0,00	13,68		221	3,04	-4,632
00:58:08	0,00	13,71		221	3,04	-4,789
00:58:17	0,00	13,74		221	3,04	-4,938
00:58:27	0,00	13,76		221	3,04	-5,081
00:58:37	0,00	13,78		221	3,04	-5,219
00:58:46	0,00	13,81		221	3,03	-5,353
00:58:56	0,00	13,83		221	3,03	-5,482
00:59:05	0,00	13,85		220	3,03	-5,607
00:59:15	0,00	13,87		220	3,02	-5,730
00:59:24	0,00	13,89		220	3,02	-5,849
00:59:34	0,00	13,90		220	3,01	-5,967
00:59:43	0,00	13,92		219	3,00	-6,081
00:59:53	0,00	13,93		219	3,00	-6,194
01:00:00	0,00	13,94		219	2,99	-6,272
01:00:00	MAX. CALCULATION TIME - CALCULATION ABORTED!					

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:00:00	0,00		24,00	20		-0,005
00:00:09	0,00		24,00	20		0,000
00:00:19	0,00		24,00	20		0,000
00:00:28	0,00		24,00	20		0,000
00:00:37	0,00		24,00	20		0,000
00:00:47	0,00		24,00	20		0,000
00:00:56	0,00		24,00	20		0,000
00:01:06	0,00		24,00	20		0,000
00:01:15	0,00		24,00	20		0,000
00:01:25	0,00		24,00	20		0,000
00:01:34	0,00		24,00	20		0,000
00:01:43	0,00		24,00	20		0,000
00:01:52	0,00		24,00	20		0,077
00:02:01	0,00		24,00	20		0,104
00:02:11	0,00		24,00	20		0,141
00:02:21	0,00		24,00	20		0,184
00:02:30	0,00		24,00	20		0,234
00:02:39	0,00		24,00	20		0,300
00:02:49	0,00		24,00	20		0,376
00:02:58	0,00		24,00	20		0,463
00:03:07	0,00		24,00	20		0,561
00:03:17	0,00		24,00	20		0,675
00:03:27	0,00		24,00	20		0,748
00:03:37	0,00		24,00	20		0,793
00:03:47	0,01	0,22	23,70	23		1,116
00:03:56	0,01	0,24	22,92	23		1,311
00:04:06	0,01	0,26	21,97	24	0,13	1,535
00:04:16	0,01	0,28	20,93	24	0,14	1,786
00:04:25	0,01	0,29	19,93	24	0,14	2,048
00:04:35	0,01	0,31	18,87	25	0,16	2,357
00:04:45	0,01	0,33	17,90	25	0,17	2,692
00:04:55	0,01	0,34	17,04	25	0,18	3,063
00:05:04	0,01	0,36	16,27	25	0,19	3,458
00:05:14	0,01	0,38	15,52	25	0,20	3,887
00:05:23	0,01	0,39	14,80	26	0,21	4,346
00:05:33	0,01	0,41	14,06	26	0,22	4,877
00:05:43	0,01	0,44	13,34	26	0,23	5,445
00:05:52	0,01	0,46	12,66	27	0,24	6,051
00:06:02	0,01	0,48	12,00	27	0,25	6,694
00:06:11	0,01	0,51	11,37	28	0,26	7,376
00:06:21	0,01	0,54	10,72	28	0,28	8,154
00:06:31	0,01	0,57	10,10	29	0,29	8,979
00:06:41	0,01	0,60	9,50	29	0,30	9,850
00:06:51	0,01	0,63	8,92	30	0,32	10,768
00:07:00	0,01	0,67	8,37	30	0,33	11,734
00:07:09	0,01	0,70	7,84	31	0,34	12,748
00:07:19	0,01	0,74	7,29	31	0,35	13,888
00:07:29	0,01	0,78	6,76	32	0,37	15,085
00:07:39	0,01	0,82	6,25	33	0,38	16,337
00:07:49	0,01	0,86	5,75	33	0,39	17,647
00:07:58	0,01	0,90	5,28	34	0,40	19,014
00:08:08	0,01	0,94	4,82	35	0,41	19,551
00:08:17	0,01	0,98	4,38	35	0,43	19,065
00:08:27	0,01	1,03	3,96	36	0,44	18,604
00:08:27	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:08:35	0,01	1,07	3,63	37	0,44	18,236

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:44	0,01	1,11	3,30	37	0,45	17,870
00:08:53	0,01	1,15	2,97	38	0,46	17,508
00:08:57	0,01	1,17	2,81	38	0,46	17,329
00:08:57	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:09:07	0,01	1,21	2,49	39	0,47	16,977
00:09:17	0,01	1,26	2,17	40	0,48	16,635
00:09:26	0,01	1,30	1,90	40	0,49	16,313
00:09:36	0,01	1,34	1,63	41	0,49	15,917
00:09:44	0,01	1,38	1,42	42	0,50	15,593
00:09:53	0,01	1,42	1,22	42	0,50	15,269
00:10:01	0,00	1,46	1,03	43	0,51	14,952
00:10:10	0,00	1,50	0,87	44	0,51	14,643
00:10:19	0,00	1,54	0,71	44	0,52	14,345
00:10:28	0,00	1,57	0,58	45	0,52	14,062
00:10:37	0,00	1,62	0,46	45	0,52	13,794
00:10:46	0,00	1,66	0,35	46	0,53	13,524
00:10:55	0,00	1,70	0,27	47	0,53	13,222
00:11:05	0,00	1,74	0,20	47	0,54	12,925
00:11:12	0,00	1,77	0,15	48	0,54	12,703
00:11:20	0,00	1,81	0,12	48	0,54	12,481
00:11:29	0,00	1,85	0,08	49	0,55	12,256
00:11:37	0,00	1,89	0,06	49	0,55	12,028
00:11:47	0,00	1,93	0,04	50	0,56	11,796
00:11:54	0,00	1,96	0,03	50	0,56	11,637
00:12:01	0,00	1,99	0,02	51	0,56	11,475
00:12:08	0,00	2,03	0,02	51	0,57	11,310
00:12:16	0,00	2,06	0,01	52	0,57	11,142
00:12:24	0,00	2,10	0,01	53	0,57	10,969
00:12:33	0,00	2,14	0,01	53	0,58	10,792
00:12:42	0,00	2,18		54	0,58	10,611
00:12:52	0,00	2,23		54	0,59	10,425
00:12:57	0,00	2,25		55	0,59	10,330
00:13:02	0,00	2,28		55	0,59	10,234
00:13:07	0,00	2,30		55	0,59	10,136
00:13:13	0,00	2,33		56	0,60	10,035
00:13:19	0,00	2,36		56	0,60	9,932
00:13:25	0,00	2,39		57	0,60	9,828
00:13:25	Room 'Part II' is now filled with smoke					
00:13:31	0,00	2,42		57	0,61	9,724
00:13:37	0,00	2,44		57	0,61	9,625
00:13:43	0,00	2,47		58	0,61	9,526
00:13:49	0,00	2,50		58	0,62	9,435
00:13:57	0,00	2,54		59	0,62	9,303
00:14:05	0,00	2,58		59	0,62	9,183
00:14:10	0,00	2,60		60	0,63	9,108
00:14:15	0,00	2,63		60	0,63	9,031
00:14:24	0,00	2,67		61	0,63	8,898
00:14:32	0,00	2,71		61	0,64	8,784
00:14:42	0,00	2,76		62	0,64	8,650
00:14:51	0,00	2,80		62	0,65	8,528
00:14:59	0,00	2,84		63	0,65	8,422
00:15:09	0,00	2,88		64	0,66	8,301
00:15:18	0,00	2,93		64	0,66	8,185
00:15:26	0,00	2,97		65	0,67	8,084
00:15:35	0,00	3,01		65	0,67	7,977
00:15:44	0,00	3,05		66	0,68	7,871

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:15:53	0,00	3,09		67	0,68	7,775
00:16:02	0,00	3,14		67	0,68	7,674
00:16:11	0,00	3,18		68	0,69	7,574
00:16:19	0,00	3,22		68	0,69	7,487
00:16:28	0,00	3,26		69	0,70	7,394
00:16:37	0,00	3,30		70	0,70	7,299
00:16:45	0,00	3,34		70	0,71	7,215
00:16:54	0,00	3,39		71	0,71	7,131
00:17:03	0,00	3,43		71	0,72	7,044
00:17:11	0,00	3,47		72	0,72	6,962
00:17:20	0,00	3,51		72	0,73	6,881
00:17:29	0,00	3,55		73	0,73	6,802
00:17:37	0,00	3,59		74	0,74	6,726
00:17:46	0,00	3,63		74	0,74	6,648
00:17:54	0,00	3,67		75	0,75	6,573
00:18:03	0,00	3,71		75	0,75	6,502
00:18:11	0,00	3,75		76	0,76	6,428
00:18:20	0,00	3,79		76	0,76	6,357
00:18:28	0,00	3,83		77	0,77	6,289
00:18:36	0,00	3,87		77	0,77	6,219
00:18:45	0,00	3,91		78	0,78	6,152
00:18:53	0,00	3,95		79	0,78	6,087
00:19:01	0,00	3,99		79	0,79	6,020
00:19:10	0,00	4,03		80	0,79	5,957
00:19:18	0,00	4,06		80	0,80	5,894
00:19:26	0,00	4,10		81	0,80	5,830
00:19:35	0,00	4,14		81	0,80	5,770
00:19:43	0,00	4,18		82	0,81	5,710
00:19:51	0,00	4,22		82	0,81	5,649
00:20:00	0,00	4,26		83	0,82	5,591
00:20:08	0,00	4,30		83	0,82	5,534
00:20:12	0,00	4,31		84	0,83	5,505
00:20:12	Room 'Part I' is now filled with smoke					
00:20:20	0,00	4,35		84	0,83	5,448
00:20:28	0,00	4,39		85	0,84	5,392
00:20:36	0,00	4,43		85	0,84	5,338
00:20:45	0,00	4,47		86	0,85	5,280
00:20:53	0,00	4,50		86	0,85	5,228
00:21:01	0,00	4,54		87	0,86	5,176
00:21:09	0,00	4,58		87	0,86	5,123
00:21:17	0,00	4,62		88	0,87	5,071
00:21:25	0,00	4,65		88	0,87	5,018
00:21:33	0,00	4,69		89	0,88	4,969
00:21:41	0,00	4,73		89	0,88	4,916
00:21:49	0,00	4,76		90	0,89	4,870
00:21:57	0,00	4,80		90	0,89	4,821
00:22:05	0,00	4,84		91	0,90	4,772
00:22:13	0,00	4,87		91	0,90	4,724
00:22:21	0,00	4,91		92	0,91	4,677
00:22:29	0,00	4,95		92	0,91	4,630
00:22:37	0,00	4,98		93	0,92	4,581
00:22:45	0,00	5,02		93	0,92	4,538
00:22:53	0,00	5,05		94	0,93	4,489
00:23:01	0,00	5,09		94	0,93	4,447
00:23:09	0,00	5,13		95	0,94	4,400
00:23:16	0,00	5,16		95	0,94	4,358

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:24	0,00	5,20		96	0,95	4,312
00:23:32	0,00	5,23		96	0,95	4,272
00:23:40	0,00	5,27		97	0,96	4,226
00:23:48	0,00	5,30		97	0,96	4,186
00:23:56	0,00	5,34		98	0,97	4,142
00:24:03	0,00	5,37		98	0,97	4,103
00:24:11	0,00	5,41		99	0,98	4,059
00:24:19	0,00	5,44		99	0,98	4,021
00:24:27	0,00	5,48		100	0,99	3,977
00:24:35	0,00	5,51		100	0,99	3,940
00:24:42	0,00	5,55		101	1,00	3,898
00:24:50	0,00	5,58		101	1,00	3,861
00:24:58	0,00	5,62		102	1,01	3,822
00:25:05	0,00	5,65		102	1,01	3,783
00:25:13	0,00	5,69		103	1,02	3,745
00:25:21	0,00	5,72		103	1,02	3,707
00:25:28	0,00	5,76		104	1,03	3,669
00:25:36	0,00	5,79		104	1,03	3,629
00:25:44	0,00	5,82		105	1,04	3,595
00:25:51	0,00	5,86		105	1,04	3,555
00:25:59	0,00	5,89		106	1,05	3,522
00:26:07	0,00	5,93		106	1,05	3,486
00:26:14	0,00	5,96		107	1,06	3,450
00:26:22	0,00	5,99		107	1,07	3,415
00:26:29	0,00	6,03		107	1,07	3,377
00:26:37	0,00	6,06		108	1,08	3,345
00:26:44	0,00	6,09		108	1,08	3,310
00:26:52	0,00	6,13		109	1,09	3,276
00:26:59	0,00	6,16		109	1,09	3,242
00:27:07	0,00	6,19		110	1,10	3,205
00:27:14	0,00	6,23		110	1,10	3,175
00:27:22	0,00	6,26		111	1,11	3,142
00:27:29	0,00	6,29		111	1,11	3,109
00:27:37	0,00	6,33		112	1,12	3,076
00:27:44	0,00	6,36		112	1,12	3,044
00:27:52	0,00	6,39		113	1,13	3,012
00:27:59	0,00	6,42		113	1,13	2,980
00:28:07	0,00	6,46		113	1,14	2,946
00:28:14	0,00	6,49		114	1,15	2,917
00:28:21	0,00	6,52		114	1,15	2,886
00:28:29	0,00	6,55		115	1,16	2,852
00:28:36	0,00	6,59		115	1,16	2,824
00:28:44	0,00	6,62		116	1,17	2,794
00:28:51	0,00	6,65		116	1,17	2,761
00:28:58	0,00	6,68		117	1,18	2,734
00:29:06	0,00	6,72		117	1,18	2,705
00:29:13	0,00	6,75		118	1,19	2,672
00:29:20	0,00	6,78		118	1,19	2,646
00:29:28	0,00	6,81		118	1,20	2,617
00:29:35	0,00	6,84		119	1,20	2,588
00:29:42	0,00	6,88		119	1,21	2,559
00:29:49	0,00	6,91		120	1,22	2,532
00:29:57	0,00	6,94		120	1,22	2,504
00:30:04	0,00	6,97		121	1,23	2,472
00:30:11	0,00	7,00		121	1,23	2,448
00:30:18	0,00	7,03		121	1,24	2,421

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:30:26	0,00	7,06		122	1,24	2,393
00:30:33	0,00	7,09		122	1,25	2,367
00:30:40	0,00	7,13		123	1,25	2,340
00:30:47	0,00	7,16		123	1,26	2,313
00:30:54	0,00	7,19		124	1,27	2,284
00:31:01	0,00	7,22		124	1,27	2,261
00:31:09	0,00	7,25		125	1,28	2,235
00:31:16	0,00	7,28		125	1,28	2,210
00:31:23	0,00	7,31		125	1,29	2,185
00:31:30	0,00	7,34		126	1,29	2,159
00:31:37	0,00	7,37		126	1,30	2,135
00:31:44	0,00	7,40		127	1,30	2,110
00:31:52	0,00	7,43		127	1,31	2,086
00:31:59	0,00	7,46		128	1,32	2,062
00:32:06	0,00	7,49		128	1,32	2,038
00:32:13	0,00	7,53		128	1,33	2,014
00:32:20	0,00	7,56		129	1,33	1,988
00:32:27	0,00	7,59		129	1,34	1,969
00:32:34	0,00	7,62		130	1,34	1,947
00:32:41	0,00	7,65		130	1,35	1,926
00:32:48	0,00	7,68		130	1,35	1,905
00:32:55	0,00	7,71		131	1,36	1,884
00:33:02	0,00	7,74		131	1,37	1,863
00:33:09	0,00	7,77		132	1,37	1,843
00:33:16	0,00	7,80		132	1,38	1,822
00:33:23	0,00	7,83		133	1,38	1,802
00:33:30	0,00	7,86		133	1,39	1,783
00:33:37	0,00	7,89		133	1,39	1,762
00:33:44	0,00	7,91		134	1,40	1,743
00:33:51	0,00	7,94		134	1,41	1,723
00:33:58	0,00	7,97		135	1,41	1,704
00:34:04	0,00	8,00		135	1,42	1,681
00:34:11	0,00	8,03		135	1,42	1,665
00:34:18	0,00	8,06		136	1,43	1,646
00:34:25	0,00	8,09		136	1,43	1,627
00:34:32	0,00	8,12		137	1,44	1,608
00:34:39	0,00	8,15		137	1,45	1,590
00:34:46	0,00	8,18		138	1,45	1,567
00:34:53	0,00	8,21		138	1,46	1,553
00:34:59	0,00	8,24		138	1,46	1,534
00:35:06	0,00	8,27		139	1,47	1,516
00:35:13	0,00	8,29		139	1,47	1,498
00:35:20	0,00	8,32		140	1,48	1,480
00:35:27	0,00	8,35		140	1,49	1,461
00:35:34	0,00	8,38		140	1,49	1,444
00:35:40	0,00	8,41		141	1,50	1,426
00:35:47	0,00	8,44		141	1,50	1,408
00:35:54	0,00	8,47		142	1,51	1,391
00:36:01	0,00	8,49		142	1,51	1,373
00:36:07	0,00	8,52		142	1,52	1,355
00:36:14	0,00	8,55		143	1,53	1,338
00:36:21	0,00	8,58		143	1,53	1,321
00:36:28	0,00	8,61		144	1,54	1,304
00:36:34	0,00	8,64		144	1,54	1,286
00:36:41	0,00	8,66		144	1,55	1,269
00:36:48	0,00	8,69		145	1,56	1,253

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:36:54	0,00	8,72		145	1,56	1,236
00:37:01	0,00	8,75		145	1,57	1,219
00:37:08	0,00	8,78		146	1,57	1,202
00:37:18	0,00	8,82		146	1,58	1,177
00:37:25	0,00	8,85		147	1,59	1,161
00:37:34	0,00	8,89		147	1,60	1,136
00:37:44	0,00	8,93		148	1,61	1,112
00:37:54	0,00	8,97		149	1,61	1,088
00:38:04	0,00	9,01		149	1,62	1,063
00:38:14	0,00	9,05		150	1,63	1,040
00:38:24	0,00	9,09		150	1,64	1,016
00:38:34	0,00	9,14		151	1,65	0,992
00:38:44	0,00	9,18		151	1,66	0,969
00:38:54	0,00	9,22		152	1,67	0,945
00:39:03	0,00	9,26		153	1,68	0,922
00:39:13	0,00	9,30		153	1,68	0,899
00:39:23	0,00	9,34		154	1,69	0,877
00:39:33	0,00	9,38		154	1,70	0,854
00:39:43	0,00	9,42		155	1,71	0,831
00:39:52	0,00	9,46		155	1,72	0,809
00:40:00	0,00	9,49		156	1,73	0,787
00:40:00	Fire brigade is alarmed					
00:40:09	0,00	9,53		156	1,74	0,770
00:40:19	0,00	9,57		157	1,75	0,749
00:40:29	0,00	9,61		157	1,75	0,727
00:40:38	0,00	9,65		158	1,76	0,705
00:40:48	0,00	9,69		159	1,77	0,683
00:40:57	0,00	9,73		159	1,78	0,662
00:41:07	0,00	9,77		160	1,79	0,641
00:41:17	0,00	9,81		160	1,80	0,620
00:41:26	0,00	9,84		161	1,81	0,599
00:41:36	0,00	9,88		161	1,82	0,578
00:41:45	0,00	9,92		162	1,83	0,557
00:41:55	0,00	9,96		162	1,84	0,537
00:42:04	0,00	10,00		163	1,84	0,516
00:42:14	0,00	10,04		163	1,85	0,496
00:42:23	0,00	10,08		164	1,86	0,476
00:42:33	0,00	10,12		164	1,87	0,456
00:42:42	0,00	10,15		165	1,88	0,436
00:42:52	0,00	10,19		166	1,89	0,416
00:43:01	0,00	10,23		166	1,90	0,396
00:43:11	0,00	10,27		167	1,91	0,377
00:43:20	0,00	10,31		167	1,92	0,357
00:43:29	0,00	10,34		168	1,93	0,338
00:43:39	0,00	10,38		168	1,94	0,319
00:43:48	0,00	10,42		169	1,94	0,300
00:43:57	0,00	10,46		169	1,95	0,281
00:44:07	0,00	10,50		170	1,96	0,262
00:44:16	0,00	10,53		170	1,97	0,239
00:44:25	0,00	10,57		171	1,98	0,221
00:44:35	0,00	10,61		171	1,99	0,202
00:44:44	0,00	10,64		172	2,00	0,184
00:44:53	0,00	10,68		172	2,01	0,166
00:45:02	0,00	10,72		173	2,02	0,148
00:45:12	0,00	10,76		173	2,03	0,134
00:45:21	0,00	10,79		174	2,04	0,112

Part II

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:45:30	0,00	10,83		174	2,05	0,095
00:45:39	0,00	10,87		175	2,06	0,077
00:45:48	0,00	10,90		175	2,06	0,060
00:45:58	0,00	10,94		176	2,07	0,047
00:46:07	0,00	10,98		176	2,08	0,026
00:46:16	0,00	11,01		177	2,09	0,009
00:46:25	0,00	11,05		177	2,10	-0,007
00:46:34	0,00	11,09		178	2,11	-0,019
00:46:43	0,00	11,12		178	2,12	-0,039
00:46:52	0,00	11,16		179	2,13	-0,055
00:47:01	0,00	11,19		179	2,14	-0,071
00:47:11	0,00	11,23		180	2,15	-0,086
00:47:20	0,00	11,27		180	2,16	-0,102
00:47:29	0,00	11,30		181	2,17	-0,117
00:47:38	0,00	11,34		181	2,18	-0,132
00:47:47	0,00	11,37		182	2,19	-0,147
00:47:56	0,00	11,41		182	2,20	-0,162
00:48:05	0,00	11,44		183	2,21	-0,177
00:48:14	0,00	11,48		183	2,21	-0,192
00:48:23	0,00	11,51		184	2,22	-0,202
00:48:32	0,00	11,55		184	2,23	-0,221
00:48:40	0,00	11,58		185	2,24	-0,236
00:48:49	0,00	11,62		185	2,25	-0,250
00:48:58	0,00	11,65		186	2,26	-0,264
00:49:07	0,00	11,69		186	2,27	-0,274
00:49:16	0,00	11,72		187	2,28	-0,293
00:49:25	0,00	11,76		187	2,29	-0,307
00:49:34	0,00	11,79		188	2,30	-0,321
00:49:43	0,00	11,83		188	2,31	-0,335
00:49:49	0,00	11,85		188	2,32	-0,340
00:49:49	Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:49:57	0,00	11,89		189	2,32	-0,358
00:50:06	0,00	11,92		189	2,33	-0,372
00:50:15	0,00	11,95		190	2,34	-0,386
00:50:24	0,00	11,99		190	2,35	-0,399
00:50:33	0,00	12,02		191	2,36	-0,413
00:50:41	0,00	12,06		191	2,37	-0,426
00:50:50	0,00	12,09		192	2,38	-0,440
00:50:59	0,00	12,12		192	2,39	-0,453
00:51:08	0,00	12,16		193	2,40	-0,467
00:51:16	0,00	12,19		193	2,41	-0,480
00:51:25	0,00	12,23		193	2,42	-0,493
00:51:34	0,00	12,26		194	2,43	-0,506
00:51:43	0,00	12,29		194	2,44	-0,519
00:51:51	0,00	12,33		195	2,45	-0,532
00:52:00	0,00	12,36		195	2,46	-0,545
00:52:08	0,00	12,39		196	2,47	-0,558
00:52:17	0,00	12,43		196	2,48	-0,571
00:52:26	0,00	12,46		197	2,49	-0,583
00:52:35	0,00	12,49		197	2,50	-0,596
00:52:40	0,00	12,52		197	2,50	-0,605
00:52:40	Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:52:49	0,00	12,55		198	2,51	-0,617
00:52:57	0,00	12,58		198	2,52	-0,630

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:53:06	0,00	12,61		199	2,53	-0,642
00:53:15	0,00	12,65		199	2,54	-0,650
00:53:23	0,00	12,68		200	2,55	-0,667
00:53:32	0,00	12,71		200	2,56	-0,679
00:53:40	0,00	12,75		201	2,57	-0,692
00:53:49	0,00	12,78		201	2,58	-0,704
00:53:57	0,00	12,81		201	2,59	-0,716
00:54:06	0,00	12,84		202	2,60	-0,728
00:54:14	0,00	12,88		202	2,61	-0,736
00:54:23	0,00	12,91		203	2,62	-0,752
00:54:31	0,00	12,94		203	2,63	-0,764
00:54:40	0,00	12,97		204	2,64	-0,776
00:54:48	0,00	13,00		204	2,65	-0,788
00:54:57	0,00	13,04		204	2,66	-0,800
00:55:00	0,00	13,05		205	2,66	-0,804
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:08	0,00	13,08		205	2,67	-0,811
00:55:16	0,00	13,11		205	2,68	-0,827
00:55:25	0,00	13,14		206	2,69	-0,839
00:55:33	0,00	13,17		206	2,70	-0,845
00:55:42	0,00	13,21		207	2,71	-0,862
00:55:50	0,00	13,24		207	2,72	-0,873
00:56:00	0,00	13,27		208	2,73	-0,884
00:56:00	Fire brigade ready, extinguishing started					
00:56:08	0,00	13,30		208	2,74	-0,897
00:56:16	0,00	13,34		209	2,75	-0,904
00:56:25	0,00	13,37		209	2,76	-0,920
00:56:32	0,00	13,40		209	2,77	-1,023
00:56:32	Fire is declining					
00:56:42	0,00	13,43		210	2,78	-1,328
00:56:51	0,00	13,47		210	2,79	-1,608
00:57:01	0,00	13,50		211	2,80	-1,877
00:57:11	0,00	13,53		211	2,81	-2,125
00:57:20	0,00	13,57		211	2,81	-2,353
00:57:30	0,00	13,60		212	2,82	-2,577
00:57:39	0,00	13,63		212	2,83	-2,785
00:57:49	0,00	13,66		212	2,83	-2,978
00:57:58	0,00	13,69		212	2,84	-3,172
00:58:08	0,00	13,71		213	2,84	-3,353
00:58:17	0,00	13,74		213	2,84	-3,528
00:58:27	0,00	13,77		213	2,85	-3,693
00:58:37	0,00	13,79		213	2,85	-3,862
00:58:46	0,00	13,81		213	2,85	-4,022
00:58:56	0,00	13,84		213	2,85	-4,179
00:59:05	0,00	13,86		213	2,85	-4,332
00:59:15	0,00	13,87		213	2,85	-4,483
00:59:24	0,00	13,89		213	2,85	-4,631
00:59:34	0,00	13,91		213	2,84	-4,777
00:59:43	0,00	13,93		213	2,84	-4,921
00:59:53	0,00	13,94		213	2,84	-5,063
01:00:00	0,00	13,95		212	2,84	-5,161
01:00:00	MAX. CALCULATION TIME - CALCULATION ABORTED!					

Calculation

Basic information

Client:	BWSC
Scenario name:	Part I
Consultant:	Rambøll
Reference no.:	
Company type:	Industry, chemical
Basic bldg. construction:	Brick-wall/concrete-roof
Last revision:	12-12-2018 14:27:23
Revision No.:	40

Calculation options

Post flash-over model enabled:	x
Time limit [min]:	60
Plumemodel:	Heskestad

Fire brigade

Fire brigade active:	–
City area:	–
24 hour:	–
Distance/fire station [km]:	10,0
Calculated response time [min]:	15
Time before manual alarm [min]:	40

Fire start

Fire start room:	Part II
Fire start, type:	Energy formula fire
Fire start, name:	11 MW Fast
Fire start, code:	-
Optical smoke potential [dB/m]:	100,0
Maximum Q(t) [MW]:	11,00
Parabolic growth [MW/min²]:	0,1692
Parabolic growth [kW/s²]:	0,0470
Linear growth [MW/min]:	0,0000
Constant fire [MW]:	0,0000
Initial fire [kW]:	0,00
Doubling time [min]:	0,00

Fire installations

	[--- In operation				---]	
Room name	AFV Heat	AFV Smoke	AFV Timer	Sprinkler	AFA Heat	AFA Smoke	Windload [m/s]
Part I	–	–	–	–	–	–	0,00
Part II	–	–	–	–	–	–	0,00

Events

Fire progression:
Energy formula fire > 11 MW Fast
Plumemodel > Heskestad
00:07:40 : Critical condition in room 'Part I': Smoke free height less than 5,20 m
00:09:11 : Critical condition in room 'Part II': Smoke free height less than 4,00 m
00:12:34 : Room 'Part I' is now filled with smoke
00:16:10 : Room 'Part II' is now filled with smoke
00:40:00 : Fire brigade is alarmed
00:48:13 : Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²
00:52:36 : Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²
00:55:00 : Fire brigade arrived, preparing extinguishing
00:56:00 : Fire brigade ready, extinguishing started
00:56:32 : Fire is declining
01:00:00 : MAX. CALCULATION TIME - CALCULATION ABORTED!

RHR and smoke layer temperature in all rooms

Time	Rate of heat release [kW]	[------ Smoke layer temp. [ºC] ------] Part I	Part II
00:00:00	0	20	20
00:00:09	4	20	20
00:00:18	17	20	20
00:00:28	39	20	20
00:00:38	68	20	20
00:00:47	108	20	20
00:00:57	157	20	20
00:01:06	209	20	20
00:01:15	269	20	20
00:01:25	340	20	22
00:01:34	423	20	22
00:01:44	513	20	23
00:01:53	610	20	23
00:02:03	718	20	23
00:02:13	838	20	24
00:02:23	965	20	24
00:02:32	1.096	21	25
00:02:42	1.244	21	25
00:02:52	1.399	22	26
00:03:02	1.561	22	26
00:03:11	1.731	22	27
00:03:21	1.909	22	28
00:03:31	2.096	23	28
00:03:40	2.291	23	29
00:03:50	2.496	23	29
00:04:00	2.709	24	30
00:04:09	2.927	24	31
00:04:18	3.149	24	31
00:04:28	3.391	25	32
00:04:38	3.647	25	33
00:04:47	3.892	25	33
00:04:57	4.154	25	34
00:05:06	4.423	26	34
00:05:16	4.698	26	35
00:05:25	4.978	27	35
00:05:35	5.285	27	36
00:05:45	5.597	27	36
00:05:54	5.914	28	37
00:06:04	6.234	28	37
00:06:13	6.560	29	38
00:06:23	6.914	29	38
00:06:33	7.273	30	39
00:06:43	7.637	30	39
00:06:52	8.005	31	40
00:07:02	8.378	31	40
00:07:11	8.754	32	41
00:07:21	9.162	32	42

00:07:31	9.575	33	42
00:07:40	9.964	33	43
00:07:40		Critical condition in room 'Part I': Smoke free height less than 5,20 m	
00:07:50	10.385	34	44
00:07:59	10.810	35	44
00:08:08	11.000	35	45
00:08:17	11.000	36	46
00:08:25	11.000	36	46
00:08:34	11.000	37	47
00:08:43	11.000	38	47
00:08:53	11.000	38	48
00:09:02	11.000	39	48
00:09:11	11.000	40	49
00:09:11		Critical condition in room 'Part II': Smoke free height less than 4,00 m	
00:09:20	11.000	40	49
00:09:29	11.000	41	50
00:09:39	11.000	41	51
00:09:48	11.000	42	51
00:09:58	11.000	43	52
00:10:07	11.000	43	53
00:10:15	11.000	44	53
00:10:24	11.000	44	54
00:10:34	11.000	45	55
00:10:42	11.000	46	55
00:10:50	11.000	46	56
00:10:59	11.000	47	56
00:11:09	11.000	48	57
00:11:17	11.000	48	58
00:11:25	11.000	49	58
00:11:34	11.000	49	59
00:11:43	11.000	50	60
00:11:50	11.000	50	60
00:11:58	11.000	51	61
00:12:05	11.000	52	61
00:12:14	11.000	52	62
00:12:23	11.000	53	63
00:12:28	11.000	53	63
00:12:34	11.000	54	64
00:12:34		Room 'Part I' is now filled with smoke	
00:12:39	11.000	54	64
00:12:49	11.000	55	65
00:12:54	11.000	55	65
00:13:00	11.000	55	66
00:13:05	11.000	56	66
00:13:10	11.000	56	66
00:13:16	11.000	56	67
00:13:23	11.000	57	67
00:13:29	11.000	57	68
00:13:38	11.000	58	68
00:13:46	11.000	59	69
00:13:55	11.000	59	69
00:14:00	11.000	60	70
00:14:09	11.000	60	70
00:14:17	11.000	61	71
00:14:26	11.000	61	72
00:14:35	11.000	62	72
00:14:43	11.000	63	73
00:14:52	11.000	63	74
00:15:01	11.000	64	74

00:15:10	11.000	64	75
00:15:18	11.000	65	75
00:15:27	11.000	65	76
00:15:36	11.000	66	77
00:15:44	11.000	67	77
00:15:53	11.000	67	78
00:16:01	11.000	68	78
00:16:10	11.000	68	79
00:16:10		Room 'Part II' is now filled with smoke	
00:16:18	11.000	69	80
00:16:27	11.000	69	80
00:16:35	11.000	70	81
00:16:44	11.000	71	81
00:16:52	11.000	71	82
00:17:00	11.000	72	82
00:17:09	11.000	72	83
00:17:17	11.000	73	84
00:17:26	11.000	73	84
00:17:34	11.000	74	85
00:17:43	11.000	74	85
00:17:51	11.000	75	86
00:17:59	11.000	76	86
00:18:07	11.000	76	87
00:18:16	11.000	77	87
00:18:24	11.000	77	88
00:18:32	11.000	78	89
00:18:40	11.000	78	89
00:18:49	11.000	79	90
00:18:57	11.000	79	90
00:19:05	11.000	80	91
00:19:13	11.000	80	91
00:19:21	11.000	81	92
00:19:29	11.000	81	92
00:19:37	11.000	82	93
00:19:46	11.000	82	94
00:19:54	11.000	83	94
00:20:02	11.000	84	95
00:20:10	11.000	84	95
00:20:18	11.000	85	96
00:20:26	11.000	85	96
00:20:34	11.000	86	97
00:20:42	11.000	86	97
00:20:50	11.000	87	98
00:20:58	11.000	87	98
00:21:06	11.000	88	99
00:21:14	11.000	88	99
00:21:22	11.000	89	100
00:21:30	11.000	89	100
00:21:38	11.000	90	101
00:21:46	11.000	90	101
00:21:54	11.000	91	102
00:22:01	11.000	91	102
00:22:09	11.000	92	103
00:22:17	11.000	92	103
00:22:25	11.000	93	104
00:22:33	11.000	93	104
00:22:41	11.000	94	105
00:22:48	11.000	94	106
00:22:56	11.000	95	106

00:23:04	11.000	95	107
00:23:12	11.000	96	107
00:23:19	11.000	96	108
00:23:27	11.000	97	108
00:23:35	11.000	97	109
00:23:43	11.000	98	109
00:23:50	11.000	98	110
00:23:58	11.000	99	110
00:24:06	11.000	99	111
00:24:13	11.000	99	111
00:24:21	11.000	100	112
00:24:29	11.000	100	112
00:24:36	11.000	101	112
00:24:44	11.000	101	113
00:24:52	11.000	102	113
00:24:59	11.000	102	114
00:25:07	11.000	103	114
00:25:14	11.000	103	115
00:25:22	11.000	104	115
00:25:30	11.000	104	116
00:25:37	11.000	105	116
00:25:45	11.000	105	117
00:25:52	11.000	106	117
00:26:00	11.000	106	118
00:26:07	11.000	107	118
00:26:15	11.000	107	119
00:26:22	11.000	107	119
00:26:30	11.000	108	120
00:26:37	11.000	108	120
00:26:44	11.000	109	121
00:26:52	11.000	109	121
00:26:59	11.000	110	122
00:27:07	11.000	110	122
00:27:14	11.000	111	123
00:27:22	11.000	111	123
00:27:29	11.000	112	123
00:27:36	11.000	112	124
00:27:44	11.000	113	124
00:27:51	11.000	113	125
00:27:58	11.000	113	125
00:28:06	11.000	114	126
00:28:13	11.000	114	126
00:28:20	11.000	115	127
00:28:28	11.000	115	127
00:28:35	11.000	116	128
00:28:42	11.000	116	128
00:28:49	11.000	117	129
00:28:57	11.000	117	129
00:29:04	11.000	117	129
00:29:11	11.000	118	130
00:29:18	11.000	118	130
00:29:26	11.000	119	131
00:29:33	11.000	119	131
00:29:40	11.000	120	132
00:29:47	11.000	120	132
00:29:54	11.000	120	133
00:30:01	11.000	121	133
00:30:09	11.000	121	134
00:30:16	11.000	122	134

00:30:23	11.000	122	134
00:30:30	11.000	123	135
00:30:37	11.000	123	135
00:30:44	11.000	123	136
00:30:51	11.000	124	136
00:30:58	11.000	124	137
00:31:05	11.000	125	137
00:31:12	11.000	125	138
00:31:19	11.000	126	138
00:31:26	11.000	126	138
00:31:33	11.000	126	139
00:31:41	11.000	127	139
00:31:47	11.000	127	140
00:31:54	11.000	128	140
00:32:01	11.000	128	141
00:32:08	11.000	129	141
00:32:15	11.000	129	141
00:32:22	11.000	129	142
00:32:29	11.000	130	142
00:32:36	11.000	130	143
00:32:43	11.000	131	143
00:32:50	11.000	131	144
00:32:57	11.000	131	144
00:33:04	11.000	132	144
00:33:11	11.000	132	145
00:33:18	11.000	133	145
00:33:25	11.000	133	146
00:33:31	11.000	134	146
00:33:38	11.000	134	146
00:33:45	11.000	134	147
00:33:52	11.000	135	147
00:33:59	11.000	135	148
00:34:06	11.000	136	148
00:34:12	11.000	136	149
00:34:19	11.000	136	149
00:34:26	11.000	137	149
00:34:33	11.000	137	150
00:34:40	11.000	138	150
00:34:46	11.000	138	151
00:34:53	11.000	138	151
00:35:00	11.000	139	151
00:35:07	11.000	139	152
00:35:17	11.000	140	152
00:35:23	11.000	140	153
00:35:33	11.000	141	153
00:35:40	11.000	141	154
00:35:47	11.000	142	154
00:35:57	11.000	142	155
00:36:04	11.000	142	155
00:36:13	11.000	143	156
00:36:20	11.000	143	156
00:36:30	11.000	144	157
00:36:40	11.000	145	157
00:36:50	11.000	145	158
00:37:00	11.000	146	159
00:37:10	11.000	146	159
00:37:20	11.000	147	160
00:37:29	11.000	147	160
00:37:39	11.000	148	161

00:37:49	11.000	149	162
00:37:59	11.000	149	162
00:38:09	11.000	150	163
00:38:18	11.000	150	163
00:38:28	11.000	151	164
00:38:38	11.000	151	164
00:38:48	11.000	152	165
00:38:57	11.000	153	166
00:39:07	11.000	153	166
00:39:17	11.000	154	167
00:39:26	11.000	154	167
00:39:36	11.000	155	168
00:39:46	11.000	155	168
00:39:55	11.000	156	169
00:40:00	11.000	156	169
00:40:00		Fire brigade is alarmed	
00:40:09	11.000	157	170
00:40:19	11.000	157	170
00:40:28	11.000	158	171
00:40:38	11.000	158	171
00:40:47	11.000	159	172
00:40:57	11.000	159	173
00:41:06	11.000	160	173
00:41:16	11.000	160	174
00:41:25	11.000	161	174
00:41:35	11.000	161	175
00:41:44	11.000	162	175
00:41:53	11.000	163	176
00:42:03	11.000	163	176
00:42:12	11.000	164	177
00:42:22	11.000	164	178
00:42:31	11.000	165	178
00:42:40	11.000	165	179
00:42:50	11.000	166	179
00:42:59	11.000	166	180
00:43:08	11.000	167	180
00:43:17	11.000	167	181
00:43:27	11.000	168	181
00:43:36	11.000	168	182
00:43:45	11.000	169	182
00:43:54	11.000	169	183
00:44:04	11.000	170	183
00:44:13	11.000	170	184
00:44:22	11.000	171	184
00:44:31	11.000	171	185
00:44:40	11.000	172	185
00:44:49	11.000	172	186
00:44:59	11.000	173	186
00:45:08	11.000	173	187
00:45:17	11.000	174	187
00:45:26	11.000	174	188
00:45:35	11.000	175	189
00:45:44	11.000	175	189
00:45:53	11.000	176	190
00:46:02	11.000	176	190
00:46:11	11.000	177	191
00:46:20	11.000	177	191
00:46:29	11.000	178	192
00:46:38	11.000	178	192

00:46:47	11.000	179	193
00:46:56	11.000	179	193
00:47:05	11.000	180	194
00:47:14	11.000	180	194
00:47:23	11.000	181	195
00:47:32	11.000	181	195
00:47:41	11.000	182	196
00:47:50	11.000	182	196
00:47:58	11.000	183	197
00:48:07	11.000	183	197
00:48:13	11.000	183	197
00:48:13		Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²	
00:48:22	11.000	184	198
00:48:31	11.000	184	198
00:48:40	11.000	185	199
00:48:48	11.000	185	199
00:48:57	11.000	186	200
00:49:06	11.000	186	200
00:49:15	11.000	187	201
00:49:24	11.000	187	201
00:49:32	11.000	188	202
00:49:41	11.000	188	202
00:49:50	11.000	189	203
00:49:58	11.000	189	203
00:50:07	11.000	190	204
00:50:16	11.000	190	204
00:50:25	11.000	190	205
00:50:33	11.000	191	205
00:50:42	11.000	191	205
00:50:51	11.000	192	206
00:50:59	11.000	192	206
00:51:08	11.000	193	207
00:51:16	11.000	193	207
00:51:25	11.000	194	208
00:51:34	11.000	194	208
00:51:42	11.000	195	209
00:51:51	11.000	195	209
00:51:59	11.000	195	210
00:52:08	11.000	196	210
00:52:16	11.000	196	211
00:52:25	11.000	197	211
00:52:33	11.000	197	211
00:52:36	11.000	197	212
00:52:36		Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²	
00:52:45	11.000	198	212
00:52:53	11.000	198	213
00:53:02	11.000	199	213
00:53:10	11.000	199	213
00:53:19	11.000	200	214
00:53:27	11.000	200	214
00:53:36	11.000	200	215
00:53:44	11.000	201	215
00:53:53	11.000	201	216
00:54:01	11.000	202	216
00:54:09	11.000	202	217
00:54:18	11.000	203	217
00:54:26	11.000	203	217

00:54:34	11.000	204	218
00:54:43	11.000	204	218
00:54:51	11.000	204	219
00:55:00	11.000	205	219
00:55:00		Fire brigade arrived, preparing extinguishing	
00:55:08	11.000	205	220
00:55:16	11.000	206	220
00:55:25	11.000	206	221
00:55:33	11.000	206	221
00:55:41	11.000	207	221
00:55:49	11.000	207	222
00:55:58	11.000	208	222
00:56:00	11.000	208	222
00:56:00		Fire brigade ready, extinguishing started	
00:56:08	11.000	208	223
00:56:16	11.000	209	223
00:56:24	11.000	209	224
00:56:32	10.908	210	224
00:56:32		Fire is declining	
00:56:42	10.590	210	224
00:56:51	10.271	210	225
00:57:01	9.953	211	225
00:57:10	9.634	211	225
00:57:20	9.315	212	225
00:57:30	8.997	212	225
00:57:39	8.678	212	225
00:57:49	8.360	212	225
00:57:58	8.041	213	225
00:58:08	7.723	213	225
00:58:17	7.404	213	225
00:58:27	7.086	213	224
00:58:36	6.767	213	224
00:58:46	6.448	213	224
00:58:56	6.130	213	224
00:59:05	5.811	213	223
00:59:15	5.493	213	223
00:59:24	5.174	213	223
00:59:34	4.856	213	222
00:59:43	4.537	213	222
00:59:53	4.219	213	221
01:00:00	4.000	213	221
01:00:00		MAX. CALCULATION TIME - CALCULATION ABORTED!	

Simulation results for each room

Part I

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:00:00	0,00		36,00	20		-0,010
00:00:09	0,00		36,00	20		0,000
00:00:18	0,00		36,00	20		0,000
00:00:28	0,00		36,00	20		0,000
00:00:38	0,00		36,00	20		0,000
00:00:47	0,00		36,00	20		0,000
00:00:57	0,00		36,00	20		0,000
00:01:06	0,00		36,00	20		0,000
00:01:15	0,00		36,00	20		0,000
00:01:25	0,00		36,00	20		0,022
00:01:34	0,00		36,00	20		0,029
00:01:44	0,00		36,00	20		0,035
00:01:53	0,00		36,00	20		0,040
00:02:03	0,00		36,00	20		0,044
00:02:13	0,01		36,00	20		0,048
00:02:23	0,01		36,00	20		0,051
00:02:32	0,01	0,08	35,65	21		0,236
00:02:42	0,01	0,10	33,55	21	0,09	0,301
00:02:52	0,01	0,11	31,61	22	0,10	0,377
00:03:02	0,01	0,12	29,84	22	0,11	0,464
00:03:11	0,01	0,14	28,21	22	0,12	0,565
00:03:21	0,01	0,15	26,72	22	0,13	0,681
00:03:31	0,01	0,17	25,35	23	0,14	0,813
00:03:40	0,01	0,19	24,11	23	0,15	0,962
00:03:50	0,01	0,21	22,94	23	0,15	1,133
00:04:00	0,01	0,23	21,86	24	0,16	1,324
00:04:09	0,01	0,25	20,85	24	0,17	1,534
00:04:18	0,01	0,27	19,91	24	0,18	1,764
00:04:28	0,01	0,30	18,94	25	0,19	2,033
00:04:38	0,01	0,32	18,03	25	0,21	2,342
00:04:47	0,01	0,34	17,24	25	0,22	2,664
00:04:57	0,01	0,36	16,46	25	0,23	3,033
00:05:06	0,01	0,38	15,70	26	0,24	3,440
00:05:16	0,01	0,40	14,96	26	0,25	3,880
00:05:25	0,01	0,42	14,25	27	0,26	4,354
00:05:35	0,01	0,45	13,50	27	0,27	4,905
00:05:45	0,01	0,47	12,77	27	0,28	5,495
00:05:54	0,01	0,50	12,07	28	0,29	6,124
00:06:04	0,01	0,52	11,38	28	0,30	6,793
00:06:13	0,01	0,55	10,72	29	0,31	7,503
00:06:23	0,01	0,58	10,03	29	0,33	8,313
00:06:33	0,01	0,61	9,37	30	0,34	9,171
00:06:43	0,01	0,64	8,72	30	0,35	10,077
00:06:52	0,01	0,67	8,10	31	0,36	11,031
00:07:02	0,01	0,70	7,49	31	0,37	12,035
00:07:11	0,01	0,73	6,91	32	0,38	13,089
00:07:21	0,01	0,77	6,30	32	0,40	14,274
00:07:31	0,01	0,81	5,72	33	0,41	15,517
00:07:40	0,01	0,84	5,19	33	0,42	16,730
00:07:40	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:07:50	0,01	0,88	4,65	34	0,43	18,088
00:07:59	0,01	0,92	4,13	35	0,44	19,507
00:08:08	0,01	0,95	3,64	35	0,44	19,905

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:08:17	0,01	0,99	3,21	36	0,45	19,511
00:08:25	0,01	1,02	2,81	36	0,46	19,145
00:08:34	0,01	1,06	2,44	37	0,46	18,801
00:08:43	0,01	1,10	2,09	38	0,47	18,480
00:08:53	0,00	1,14	1,72	38	0,48	18,052
00:09:02	0,00	1,18	1,40	39	0,48	17,641
00:09:11	0,00	1,21	1,16	40	0,49	17,286
00:09:11	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:09:20	0,00	1,25	0,92	40	0,49	16,928
00:09:29	0,00	1,29	0,72	41	0,49	16,590
00:09:39	0,00	1,33	0,56	41	0,50	16,276
00:09:48	0,00	1,37	0,42	42	0,50	15,986
00:09:58	0,00	1,41	0,31	43	0,51	15,720
00:10:07	0,00	1,45	0,23	43	0,51	15,415
00:10:15	0,00	1,49	0,16	44	0,52	15,096
00:10:24	0,00	1,53	0,12	44	0,52	14,770
00:10:34	0,00	1,57	0,08	45	0,52	14,440
00:10:42	0,00	1,60	0,06	46	0,53	14,171
00:10:50	0,00	1,64	0,04	46	0,53	13,897
00:10:59	0,00	1,68	0,03	47	0,54	13,618
00:11:09	0,00	1,73	0,02	48	0,54	13,331
00:11:17	0,00	1,76	0,01	48	0,54	13,109
00:11:25	0,00	1,80	0,01	49	0,55	12,880
00:11:34	0,00	1,85	0,01	49	0,55	12,644
00:11:43	0,00	1,89		50	0,56	12,397
00:11:50	0,00	1,92		50	0,56	12,227
00:11:58	0,00	1,96		51	0,56	12,052
00:12:05	0,00	2,00		52	0,57	11,870
00:12:14	0,00	2,04		52	0,57	11,683
00:12:23	0,00	2,08		53	0,58	11,487
00:12:28	0,00	2,11		53	0,58	11,374
00:12:34	0,00	2,13		54	0,58	11,261
00:12:34	Room 'Part I' is now filled with smoke					
00:12:39	0,00	2,16		54	0,58	11,147
00:12:49	0,00	2,20		55	0,59	10,964
00:12:54	0,00	2,23		55	0,59	10,868
00:13:00	0,00	2,26		55	0,59	10,760
00:13:05	0,00	2,28		56	0,60	10,664
00:13:10	0,00	2,31		56	0,60	10,567
00:13:16	0,00	2,34		56	0,60	10,467
00:13:23	0,00	2,37		57	0,61	10,355
00:13:29	0,00	2,40		57	0,61	10,256
00:13:38	0,00	2,44		58	0,61	10,097
00:13:46	0,00	2,48		59	0,62	9,981
00:13:55	0,00	2,52		59	0,62	9,840
00:14:00	0,00	2,55		60	0,63	9,761
00:14:09	0,00	2,59		60	0,63	9,632
00:14:17	0,00	2,63		61	0,63	9,521
00:14:26	0,00	2,68		61	0,64	9,390
00:14:35	0,00	2,72		62	0,64	9,266
00:14:43	0,00	2,76		63	0,65	9,161
00:14:52	0,00	2,80		63	0,65	9,047
00:15:01	0,00	2,84		64	0,66	8,932
00:15:10	0,00	2,88		64	0,66	8,833
00:15:18	0,00	2,92		65	0,67	8,731
00:15:27	0,00	2,97		65	0,67	8,622

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:15:36	0,00	3,01		66	0,68	8,529
00:15:44	0,00	3,05		67	0,68	8,436
00:15:53	0,00	3,09		67	0,68	8,337
00:16:01	0,00	3,13		68	0,69	8,246
00:16:10	0,00	3,17		68	0,69	8,160
00:16:10	Room 'Part II' is now filled with smoke					
00:16:18	0,00	3,21		69	0,70	8,069
00:16:27	0,00	3,25		69	0,70	7,981
00:16:35	0,00	3,29		70	0,71	7,903
00:16:44	0,00	3,33		71	0,71	7,818
00:16:52	0,00	3,37		71	0,72	7,736
00:17:00	0,00	3,41		72	0,72	7,658
00:17:09	0,00	3,45		72	0,73	7,581
00:17:17	0,00	3,49		73	0,73	7,504
00:17:26	0,00	3,53		73	0,74	7,432
00:17:34	0,00	3,57		74	0,74	7,356
00:17:43	0,00	3,61		74	0,75	7,281
00:17:51	0,00	3,65		75	0,75	7,214
00:17:59	0,00	3,69		76	0,75	7,143
00:18:07	0,00	3,73		76	0,76	7,073
00:18:16	0,00	3,76		77	0,76	7,007
00:18:24	0,00	3,80		77	0,77	6,940
00:18:32	0,00	3,84		78	0,77	6,873
00:18:40	0,00	3,88		78	0,78	6,810
00:18:49	0,00	3,92		79	0,78	6,745
00:18:57	0,00	3,96		79	0,79	6,679
00:19:05	0,00	3,99		80	0,79	6,621
00:19:13	0,00	4,03		80	0,80	6,559
00:19:21	0,00	4,07		81	0,80	6,498
00:19:29	0,00	4,11		81	0,81	6,439
00:19:37	0,00	4,15		82	0,81	6,380
00:19:46	0,00	4,18		82	0,82	6,321
00:19:54	0,00	4,22		83	0,82	6,265
00:20:02	0,00	4,26		84	0,83	6,208
00:20:10	0,00	4,30		84	0,83	6,152
00:20:18	0,00	4,33		85	0,84	6,097
00:20:26	0,00	4,37		85	0,84	6,042
00:20:34	0,00	4,41		86	0,85	5,988
00:20:42	0,00	4,44		86	0,85	5,935
00:20:50	0,00	4,48		87	0,85	5,882
00:20:58	0,00	4,52		87	0,86	5,830
00:21:06	0,00	4,55		88	0,86	5,778
00:21:14	0,00	4,59		88	0,87	5,728
00:21:22	0,00	4,63		89	0,87	5,677
00:21:30	0,00	4,66		89	0,88	5,627
00:21:38	0,00	4,70		90	0,88	5,578
00:21:46	0,00	4,73		90	0,89	5,529
00:21:54	0,00	4,77		91	0,89	5,481
00:22:01	0,00	4,80		91	0,90	5,433
00:22:09	0,00	4,84		92	0,90	5,385
00:22:17	0,00	4,88		92	0,91	5,339
00:22:25	0,00	4,91		93	0,91	5,292
00:22:33	0,00	4,95		93	0,92	5,246
00:22:41	0,00	4,98		94	0,92	5,201
00:22:48	0,00	5,02		94	0,93	5,156
00:22:56	0,00	5,05		95	0,93	5,111

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:04	0,00	5,09		95	0,94	5,067
00:23:12	0,00	5,12		96	0,94	5,024
00:23:19	0,00	5,16		96	0,95	4,980
00:23:27	0,00	5,19		97	0,95	4,937
00:23:35	0,00	5,23		97	0,96	4,895
00:23:43	0,00	5,26		98	0,96	4,850
00:23:50	0,00	5,30		98	0,97	4,808
00:23:58	0,00	5,33		99	0,97	4,767
00:24:06	0,00	5,37		99	0,98	4,725
00:24:13	0,00	5,40		99	0,98	4,685
00:24:21	0,00	5,43		100	0,99	4,645
00:24:29	0,00	5,47		100	0,99	4,605
00:24:36	0,00	5,50		101	1,00	4,565
00:24:44	0,00	5,54		101	1,00	4,526
00:24:52	0,00	5,57		102	1,01	4,487
00:24:59	0,00	5,60		102	1,01	4,448
00:25:07	0,00	5,64		103	1,02	4,411
00:25:14	0,00	5,67		103	1,02	4,376
00:25:22	0,00	5,71		104	1,03	4,335
00:25:30	0,00	5,74		104	1,03	4,298
00:25:37	0,00	5,77		105	1,04	4,261
00:25:45	0,00	5,81		105	1,05	4,225
00:25:52	0,00	5,84		106	1,05	4,189
00:26:00	0,00	5,87		106	1,06	4,153
00:26:07	0,00	5,91		107	1,06	4,117
00:26:15	0,00	5,94		107	1,07	4,082
00:26:22	0,00	5,97		107	1,07	4,047
00:26:30	0,00	6,00		108	1,08	4,012
00:26:37	0,00	6,04		108	1,08	3,978
00:26:44	0,00	6,07		109	1,09	3,944
00:26:52	0,00	6,10		109	1,09	3,910
00:26:59	0,00	6,13		110	1,10	3,877
00:27:07	0,00	6,17		110	1,10	3,844
00:27:14	0,00	6,20		111	1,11	3,814
00:27:22	0,00	6,23		111	1,11	3,778
00:27:29	0,00	6,26		112	1,12	3,746
00:27:36	0,00	6,30		112	1,12	3,717
00:27:44	0,00	6,33		113	1,13	3,682
00:27:51	0,00	6,36		113	1,13	3,651
00:27:58	0,00	6,39		113	1,14	3,622
00:28:06	0,00	6,43		114	1,14	3,588
00:28:13	0,00	6,46		114	1,15	3,558
00:28:20	0,00	6,49		115	1,16	3,530
00:28:28	0,00	6,52		115	1,16	3,497
00:28:35	0,00	6,55		116	1,17	3,467
00:28:42	0,00	6,58		116	1,17	3,441
00:28:49	0,00	6,62		117	1,18	3,408
00:28:57	0,00	6,65		117	1,18	3,380
00:29:04	0,00	6,68		117	1,19	3,350
00:29:11	0,00	6,71		118	1,19	3,322
00:29:18	0,00	6,74		118	1,20	3,298
00:29:26	0,00	6,77		119	1,20	3,266
00:29:33	0,00	6,80		119	1,21	3,239
00:29:40	0,00	6,83		120	1,21	3,212
00:29:47	0,00	6,87		120	1,22	3,185
00:29:54	0,00	6,90		120	1,23	3,162

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:30:01	0,00	6,93		121	1,23	3,133
00:30:09	0,00	6,96		121	1,24	3,111
00:30:16	0,00	6,99		122	1,24	3,084
00:30:23	0,00	7,02		122	1,25	3,060
00:30:30	0,00	7,05		123	1,25	3,036
00:30:37	0,00	7,08		123	1,26	3,012
00:30:44	0,00	7,11		123	1,26	2,989
00:30:51	0,00	7,14		124	1,27	2,966
00:30:58	0,00	7,17		124	1,27	2,942
00:31:05	0,00	7,20		125	1,28	2,920
00:31:12	0,00	7,23		125	1,29	2,897
00:31:19	0,00	7,26		126	1,29	2,874
00:31:26	0,00	7,29		126	1,30	2,852
00:31:33	0,00	7,32		126	1,30	2,830
00:31:41	0,00	7,35		127	1,31	2,807
00:31:47	0,00	7,38		127	1,31	2,786
00:31:54	0,00	7,41		128	1,32	2,764
00:32:01	0,00	7,44		128	1,32	2,742
00:32:08	0,00	7,47		129	1,33	2,720
00:32:15	0,00	7,50		129	1,33	2,699
00:32:22	0,00	7,53		129	1,34	2,677
00:32:29	0,00	7,56		130	1,35	2,660
00:32:36	0,00	7,59		130	1,35	2,635
00:32:43	0,00	7,62		131	1,36	2,617
00:32:50	0,00	7,65		131	1,36	2,593
00:32:57	0,00	7,68		131	1,37	2,576
00:33:04	0,00	7,71		132	1,37	2,551
00:33:11	0,00	7,74		132	1,38	2,531
00:33:18	0,00	7,77		133	1,38	2,510
00:33:25	0,00	7,79		133	1,39	2,490
00:33:31	0,00	7,82		134	1,40	2,473
00:33:38	0,00	7,85		134	1,40	2,449
00:33:45	0,00	7,88		134	1,41	2,429
00:33:52	0,00	7,91		135	1,41	2,409
00:33:59	0,00	7,94		135	1,42	2,389
00:34:06	0,00	7,97		136	1,42	2,373
00:34:12	0,00	8,00		136	1,43	2,350
00:34:19	0,00	8,03		136	1,44	2,330
00:34:26	0,00	8,05		137	1,44	2,314
00:34:33	0,00	8,08		137	1,45	2,291
00:34:40	0,00	8,11		138	1,45	2,272
00:34:46	0,00	8,14		138	1,46	2,256
00:34:53	0,00	8,17		138	1,46	2,234
00:35:00	0,00	8,20		139	1,47	2,214
00:35:07	0,00	8,22		139	1,47	2,199
00:35:17	0,00	8,27		140	1,48	2,171
00:35:23	0,00	8,29		140	1,49	2,148
00:35:33	0,00	8,34		141	1,50	2,120
00:35:40	0,00	8,36		141	1,50	2,102
00:35:47	0,00	8,39		142	1,51	2,087
00:35:57	0,00	8,43		142	1,52	2,060
00:36:04	0,00	8,46		142	1,52	2,037
00:36:13	0,00	8,50		143	1,53	2,010
00:36:20	0,00	8,53		143	1,54	1,992
00:36:30	0,00	8,57		144	1,55	1,965
00:36:40	0,00	8,61		145	1,55	1,938

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:36:50	0,00	8,65		145	1,56	1,912
00:37:00	0,00	8,70		146	1,57	1,885
00:37:10	0,00	8,74		146	1,58	1,863
00:37:20	0,00	8,78		147	1,59	1,837
00:37:29	0,00	8,82		147	1,60	1,811
00:37:39	0,00	8,86		148	1,61	1,781
00:37:49	0,00	8,90		149	1,61	1,756
00:37:59	0,00	8,94		149	1,62	1,730
00:38:09	0,00	8,98		150	1,63	1,705
00:38:18	0,00	9,02		150	1,64	1,684
00:38:28	0,00	9,06		151	1,65	1,659
00:38:38	0,00	9,10		151	1,66	1,630
00:38:48	0,00	9,14		152	1,67	1,605
00:38:57	0,00	9,18		153	1,68	1,581
00:39:07	0,00	9,22		153	1,68	1,560
00:39:17	0,00	9,26		154	1,69	1,536
00:39:26	0,00	9,30		154	1,70	1,508
00:39:36	0,00	9,34		155	1,71	1,484
00:39:46	0,00	9,38		155	1,72	1,464
00:39:55	0,00	9,41		156	1,73	1,437
00:40:00	0,00	9,43		156	1,73	1,425
00:40:00	Fire brigade is alarmed					
00:40:09	0,00	9,47		157	1,74	1,407
00:40:19	0,00	9,51		157	1,75	1,384
00:40:28	0,00	9,55		158	1,76	1,356
00:40:38	0,00	9,59		158	1,77	1,333
00:40:47	0,00	9,63		159	1,78	1,314
00:40:57	0,00	9,66		159	1,79	1,288
00:41:06	0,00	9,70		160	1,79	1,265
00:41:16	0,00	9,74		160	1,80	1,247
00:41:25	0,00	9,78		161	1,81	1,220
00:41:35	0,00	9,82		161	1,82	1,202
00:41:44	0,00	9,86		162	1,83	1,176
00:41:53	0,00	9,89		163	1,84	1,154
00:42:03	0,00	9,93		163	1,85	1,136
00:42:12	0,00	9,97		164	1,86	1,110
00:42:22	0,00	10,01		164	1,87	1,093
00:42:31	0,00	10,04		165	1,87	1,067
00:42:40	0,00	10,08		165	1,88	1,050
00:42:50	0,00	10,12		166	1,89	1,024
00:42:59	0,00	10,16		166	1,90	1,007
00:43:08	0,00	10,19		167	1,91	0,982
00:43:17	0,00	10,23		167	1,92	0,966
00:43:27	0,00	10,27		168	1,93	0,941
00:43:36	0,00	10,30		168	1,94	0,924
00:43:45	0,00	10,34		169	1,95	0,900
00:43:54	0,00	10,38		169	1,96	0,883
00:44:04	0,00	10,41		170	1,96	0,859
00:44:13	0,00	10,45		170	1,97	0,843
00:44:22	0,00	10,49		171	1,98	0,819
00:44:31	0,00	10,52		171	1,99	0,803
00:44:40	0,00	10,56		172	2,00	0,779
00:44:49	0,00	10,60		172	2,01	0,763
00:44:59	0,00	10,63		173	2,02	0,740
00:45:08	0,00	10,67		173	2,03	0,724
00:45:17	0,00	10,70		174	2,04	0,701

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:45:26	0,00	10,74		174	2,05	0,681
00:45:35	0,00	10,77		175	2,06	0,667
00:45:44	0,00	10,81		175	2,06	0,643
00:45:53	0,00	10,85		176	2,07	0,629
00:46:02	0,00	10,88		176	2,08	0,605
00:46:11	0,00	10,92		177	2,09	0,587
00:46:20	0,00	10,95		177	2,10	0,572
00:46:29	0,00	10,99		178	2,11	0,549
00:46:38	0,00	11,02		178	2,12	0,531
00:46:47	0,00	11,06		179	2,13	0,517
00:46:56	0,00	11,09		179	2,14	0,494
00:47:05	0,00	11,13		180	2,15	0,476
00:47:14	0,00	11,16		180	2,16	0,463
00:47:23	0,00	11,20		181	2,17	0,445
00:47:32	0,00	11,23		181	2,17	0,423
00:47:41	0,00	11,27		182	2,18	0,409
00:47:50	0,00	11,30		182	2,19	0,392
00:47:58	0,00	11,34		183	2,20	0,370
00:48:07	0,00	11,37		183	2,21	0,352
00:48:13	0,00	11,39		183	2,22	0,341
00:48:13	Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:48:22	0,00	11,43		184	2,23	0,324
00:48:31	0,00	11,46		184	2,24	0,311
00:48:40	0,00	11,50		185	2,25	0,294
00:48:48	0,00	11,53		185	2,26	0,277
00:48:57	0,00	11,56		186	2,26	0,256
00:49:06	0,00	11,60		186	2,27	0,239
00:49:15	0,00	11,63		187	2,28	0,227
00:49:24	0,00	11,67		187	2,29	0,210
00:49:32	0,00	11,70		188	2,30	0,194
00:49:41	0,00	11,73		188	2,31	0,173
00:49:50	0,00	11,77		189	2,32	0,157
00:49:58	0,00	11,80		189	2,33	0,141
00:50:07	0,00	11,83		190	2,34	0,129
00:50:16	0,00	11,87		190	2,35	0,114
00:50:25	0,00	11,90		190	2,36	0,098
00:50:33	0,00	11,93		191	2,37	0,082
00:50:42	0,00	11,97		191	2,38	0,066
00:50:51	0,00	12,00		192	2,39	0,051
00:50:59	0,00	12,03		192	2,40	0,031
00:51:08	0,00	12,07		193	2,40	0,016
00:51:16	0,00	12,10		193	2,41	0,001
00:51:25	0,00	12,13		194	2,42	-0,013
00:51:34	0,00	12,17		194	2,43	-0,028
00:51:42	0,00	12,20		195	2,44	-0,042
00:51:51	0,00	12,23		195	2,45	-0,056
00:51:59	0,00	12,26		195	2,46	-0,070
00:52:08	0,00	12,30		196	2,47	-0,084
00:52:16	0,00	12,33		196	2,48	-0,098
00:52:25	0,00	12,36		197	2,49	-0,112
00:52:33	0,00	12,39		197	2,50	-0,126
00:52:36	0,00	12,40		197	2,50	-0,125
00:52:36	Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:52:45	0,00	12,44		198	2,51	-0,139

Part I

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:52:53	0,00	12,47		198	2,52	-0,157
00:53:02	0,00	12,50		199	2,53	-0,171
00:53:10	0,00	12,53		199	2,54	-0,184
00:53:19	0,00	12,56		200	2,55	-0,193
00:53:27	0,00	12,60		200	2,56	-0,206
00:53:36	0,00	12,63		200	2,57	-0,219
00:53:44	0,00	12,66		201	2,58	-0,232
00:53:53	0,00	12,69		201	2,59	-0,245
00:54:01	0,00	12,72		202	2,60	-0,258
00:54:09	0,00	12,76		202	2,61	-0,276
00:54:18	0,00	12,79		203	2,62	-0,288
00:54:26	0,00	12,82		203	2,62	-0,296
00:54:34	0,00	12,85		204	2,63	-0,309
00:54:43	0,00	12,88		204	2,64	-0,322
00:54:51	0,00	12,91		204	2,65	-0,334
00:55:00	0,00	12,94		205	2,66	-0,351
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:08	0,00	12,98		205	2,67	-0,364
00:55:16	0,00	13,01		206	2,68	-0,372
00:55:25	0,00	13,04		206	2,69	-0,384
00:55:33	0,00	13,07		206	2,70	-0,396
00:55:41	0,00	13,10		207	2,71	-0,413
00:55:49	0,00	13,13		207	2,72	-0,421
00:55:58	0,00	13,16		208	2,73	-0,433
00:56:00	0,00	13,17		208	2,73	-0,437
00:56:00	Fire brigade ready, extinguishing started					
00:56:08	0,00	13,20		208	2,74	-0,448
00:56:16	0,00	13,23		209	2,75	-0,460
00:56:24	0,00	13,26		209	2,76	-0,476
00:56:32	0,00	13,29		210	2,77	-0,575
00:56:32	Fire is declining					
00:56:42	0,00	13,33		210	2,78	-0,886
00:56:51	0,00	13,36		210	2,79	-1,177
00:57:01	0,00	13,39		211	2,80	-1,448
00:57:10	0,00	13,43		211	2,81	-1,702
00:57:20	0,00	13,46		212	2,82	-1,942
00:57:30	0,00	13,49		212	2,82	-2,169
00:57:39	0,00	13,52		212	2,83	-2,385
00:57:49	0,00	13,55		212	2,84	-2,596
00:57:58	0,00	13,58		213	2,84	-2,790
00:58:08	0,00	13,61		213	2,84	-2,981
00:58:17	0,00	13,64		213	2,85	-3,166
00:58:27	0,00	13,66		213	2,85	-3,346
00:58:36	0,00	13,69		213	2,85	-3,521
00:58:46	0,00	13,71		213	2,85	-3,692
00:58:56	0,00	13,73		213	2,85	-3,860
00:59:05	0,00	13,76		213	2,85	-4,025
00:59:15	0,00	13,78		213	2,85	-4,187
00:59:24	0,00	13,79		213	2,85	-4,346
00:59:34	0,00	13,81		213	2,85	-4,504
00:59:43	0,00	13,83		213	2,85	-4,661
00:59:53	0,00	13,85		213	2,84	-4,816
01:00:00	0,00	13,86		213	2,84	-4,922
01:00:00	MAX. CALCULATION TIME - CALCULATION ABORTED!					

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:00:00	0,00		24,00	20		-0,005
00:00:09	0,00		24,00	20		0,000
00:00:18	0,00		24,00	20		0,000
00:00:28	0,00		24,00	20		0,000
00:00:38	0,00		24,00	20		0,000
00:00:47	0,00		24,00	20		0,000
00:00:57	0,00		24,00	20		0,000
00:01:06	0,01		24,00	20		0,000
00:01:15	0,01		24,00	20		0,000
00:01:25	0,01	0,14	23,53	22		0,022
00:01:34	0,01	0,15	22,63	22	0,12	0,029
00:01:44	0,01	0,17	21,86	23	0,13	0,034
00:01:53	0,01	0,19	21,21	23	0,13	0,037
00:02:03	0,01	0,21	20,67	23	0,14	0,039
00:02:13	0,01	0,23	20,23	24	0,14	0,039
00:02:23	0,01	0,26	19,91	24	0,14	0,039
00:02:32	0,01	0,28	19,68	25	0,15	0,220
00:02:42	0,01	0,31	19,50	25	0,15	0,281
00:02:52	0,01	0,34	19,39	26	0,15	0,353
00:03:02	0,01	0,37	19,31	26	0,15	0,436
00:03:11	0,01	0,40	19,27	27	0,16	0,533
00:03:21	0,01	0,43	19,24	28	0,16	0,646
00:03:31	0,01	0,47	19,23	28	0,16	0,775
00:03:40	0,01	0,50	19,22	29	0,16	0,921
00:03:50	0,01	0,54	19,21	29	0,16	1,089
00:04:00	0,01	0,57	19,19	30	0,16	1,278
00:04:09	0,01	0,60	19,14	31	0,17	1,488
00:04:18	0,01	0,64	19,05	31	0,17	1,718
00:04:28	0,01	0,67	18,90	32	0,17	1,990
00:04:38	0,01	0,71	18,63	33	0,18	2,302
00:04:47	0,01	0,74	18,27	33	0,18	2,626
00:04:57	0,01	0,76	17,84	34	0,19	2,994
00:05:06	0,01	0,79	17,38	34	0,19	3,399
00:05:16	0,01	0,81	16,90	35	0,20	3,837
00:05:25	0,01	0,83	16,40	35	0,21	4,308
00:05:35	0,01	0,86	15,86	36	0,22	4,856
00:05:45	0,01	0,88	15,32	36	0,23	5,442
00:05:54	0,01	0,91	14,78	37	0,24	6,068
00:06:04	0,01	0,93	14,24	37	0,25	6,733
00:06:13	0,01	0,96	13,70	38	0,26	7,438
00:06:23	0,01	0,99	13,12	38	0,27	8,242
00:06:33	0,01	1,02	12,55	39	0,28	9,093
00:06:43	0,01	1,05	11,99	39	0,30	9,992
00:06:52	0,01	1,08	11,43	40	0,31	10,939
00:07:02	0,01	1,11	10,89	40	0,32	11,933
00:07:11	0,01	1,15	10,35	41	0,33	12,975
00:07:21	0,01	1,18	9,78	42	0,35	14,145
00:07:31	0,01	1,22	9,22	42	0,36	15,371
00:07:40	0,01	1,26	8,71	43	0,38	16,565
00:07:40	Critical condition in room 'Part I': Smoke free height less than 5,20 m					
00:07:50	0,01	1,30	8,17	44	0,39	17,896
00:07:59	0,01	1,34	7,63	44	0,41	19,282
00:08:08	0,01	1,38	7,12	45	0,43	19,644
00:08:17	0,01	1,41	6,66	46	0,44	19,222
00:08:25	0,01	1,44	6,20	46	0,45	18,824
00:08:34	0,01	1,47	5,74	47	0,46	18,439

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:08:43	0,01	1,50	5,29	47	0,48	18,066
00:08:53	0,01	1,54	4,79	48	0,49	17,557
00:09:02	0,01	1,57	4,32	48	0,50	17,045
00:09:11	0,01	1,61	3,93	49	0,51	16,582
00:09:11	Critical condition in room 'Part II': Smoke free height less than 4,00 m					
00:09:20	0,01	1,64	3,52	49	0,52	16,088
00:09:29	0,01	1,68	3,14	50	0,53	15,591
00:09:39	0,01	1,72	2,77	51	0,54	15,095
00:09:48	0,01	1,76	2,42	51	0,55	14,603
00:09:58	0,01	1,80	2,09	52	0,56	14,118
00:10:07	0,01	1,84	1,81	53	0,57	13,601
00:10:15	0,01	1,88	1,57	53	0,57	13,084
00:10:24	0,01	1,92	1,35	54	0,58	12,560
00:10:34	0,00	1,97	1,14	55	0,58	12,034
00:10:42	0,00	2,00	0,99	55	0,59	11,613
00:10:50	0,00	2,05	0,85	56	0,60	11,193
00:10:59	0,00	2,09	0,73	56	0,60	10,772
00:11:09	0,00	2,14	0,61	57	0,61	10,352
00:11:17	0,00	2,17	0,53	58	0,61	10,035
00:11:25	0,00	2,21	0,46	58	0,62	9,717
00:11:34	0,00	2,26	0,39	59	0,62	9,397
00:11:43	0,00	2,30	0,33	60	0,63	9,074
00:11:50	0,00	2,33	0,29	60	0,63	8,855
00:11:58	0,00	2,37	0,26	61	0,64	8,635
00:12:05	0,00	2,41	0,23	61	0,64	8,412
00:12:14	0,00	2,45	0,19	62	0,64	8,185
00:12:23	0,00	2,49	0,17	63	0,65	7,955
00:12:28	0,00	2,52	0,15	63	0,65	7,824
00:12:34	0,00	2,54	0,14	64	0,66	7,695
00:12:34	Room 'Part I' is now filled with smoke					
00:12:39	0,00	2,57	0,13	64	0,66	7,563
00:12:49	0,00	2,61	0,11	65	0,66	7,358
00:12:54	0,00	2,64	0,10	65	0,67	7,254
00:13:00	0,00	2,67	0,09	66	0,67	7,134
00:13:05	0,00	2,69	0,08	66	0,67	7,030
00:13:10	0,00	2,72	0,07	66	0,68	6,926
00:13:16	0,00	2,74	0,07	67	0,68	6,821
00:13:23	0,00	2,78	0,06	67	0,68	6,700
00:13:29	0,00	2,80	0,05	68	0,69	6,597
00:13:38	0,00	2,85	0,05	68	0,69	6,431
00:13:46	0,00	2,88	0,04	69	0,70	6,312
00:13:55	0,00	2,93	0,03	69	0,70	6,169
00:14:00	0,00	2,95	0,03	70	0,71	6,087
00:14:09	0,00	2,99	0,03	70	0,71	5,958
00:14:17	0,00	3,03	0,02	71	0,72	5,846
00:14:26	0,00	3,08	0,02	72	0,72	5,715
00:14:35	0,00	3,12	0,02	72	0,73	5,595
00:14:43	0,00	3,16	0,01	73	0,73	5,490
00:14:52	0,00	3,20	0,01	74	0,74	5,378
00:15:01	0,00	3,24	0,01	74	0,74	5,266
00:15:10	0,00	3,28	0,01	75	0,75	5,170
00:15:18	0,00	3,32	0,01	75	0,75	5,071
00:15:27	0,00	3,36	0,01	76	0,76	4,968
00:15:36	0,00	3,40		77	0,76	4,877
00:15:44	0,00	3,44		77	0,77	4,789
00:15:53	0,00	3,48		78	0,77	4,694

Part II

Time	*Smoke room [dB/m]*	*Smoke layer [dB/m]*	*Floor layer [m]*	*Layer temp. [ºC]*	*Heat radiation [kW/m²]*	*Floor pressure [N/m²]*
00:16:01	0,00	3,52		78	0,78	4,607
00:16:10	0,00	3,56		79	0,78	4,525
00:16:10	Room 'Part II' is now filled with smoke					
00:16:18	0,00	3,60		80	0,79	4,440
00:16:27	0,00	3,64		80	0,79	4,359
00:16:35	0,00	3,67		81	0,80	4,286
00:16:44	0,00	3,71		81	0,81	4,207
00:16:52	0,00	3,75		82	0,81	4,132
00:17:00	0,00	3,79		82	0,82	4,061
00:17:09	0,00	3,83		83	0,82	3,988
00:17:17	0,00	3,87		84	0,83	3,917
00:17:26	0,00	3,90		84	0,83	3,850
00:17:34	0,00	3,94		85	0,84	3,781
00:17:43	0,00	3,98		85	0,84	3,713
00:17:51	0,00	4,02		86	0,85	3,650
00:17:59	0,00	4,06		86	0,85	3,585
00:18:07	0,00	4,10		87	0,86	3,521
00:18:16	0,00	4,13		87	0,86	3,460
00:18:24	0,00	4,17		88	0,87	3,398
00:18:32	0,00	4,21		89	0,87	3,337
00:18:40	0,00	4,24		89	0,88	3,279
00:18:49	0,00	4,28		90	0,88	3,220
00:18:57	0,00	4,32		90	0,89	3,162
00:19:05	0,00	4,36		91	0,90	3,106
00:19:13	0,00	4,39		91	0,90	3,050
00:19:21	0,00	4,43		92	0,91	2,995
00:19:29	0,00	4,47		92	0,91	2,941
00:19:37	0,00	4,50		93	0,92	2,888
00:19:46	0,00	4,54		94	0,92	2,834
00:19:54	0,00	4,57		94	0,93	2,782
00:20:02	0,00	4,61		95	0,93	2,731
00:20:10	0,00	4,65		95	0,94	2,680
00:20:18	0,00	4,68		96	0,94	2,630
00:20:26	0,00	4,72		96	0,95	2,581
00:20:34	0,00	4,76		97	0,95	2,531
00:20:42	0,00	4,79		97	0,96	2,483
00:20:50	0,00	4,83		98	0,97	2,436
00:20:58	0,00	4,86		98	0,97	2,388
00:21:06	0,00	4,90		99	0,98	2,342
00:21:14	0,00	4,93		99	0,98	2,296
00:21:22	0,00	4,97		100	0,99	2,250
00:21:30	0,00	5,00		100	0,99	2,205
00:21:38	0,00	5,04		101	1,00	2,161
00:21:46	0,00	5,07		101	1,00	2,117
00:21:54	0,00	5,11		102	1,01	2,074
00:22:01	0,00	5,14		102	1,02	2,031
00:22:09	0,00	5,18		103	1,02	1,988
00:22:17	0,00	5,21		103	1,03	1,946
00:22:25	0,00	5,25		104	1,03	1,904
00:22:33	0,00	5,28		104	1,04	1,863
00:22:41	0,00	5,31		105	1,04	1,822
00:22:48	0,00	5,35		106	1,05	1,782
00:22:56	0,00	5,38		106	1,05	1,742
00:23:04	0,00	5,42		107	1,06	1,703
00:23:12	0,00	5,45		107	1,07	1,664
00:23:19	0,00	5,48		108	1,07	1,625

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:23:27	0,00	5,52		108	1,08	1,586
00:23:35	0,00	5,55		109	1,08	1,549
00:23:43	0,00	5,59		109	1,09	1,511
00:23:50	0,00	5,62		110	1,09	1,473
00:23:58	0,00	5,65		110	1,10	1,437
00:24:06	0,00	5,69		111	1,11	1,400
00:24:13	0,00	5,72		111	1,11	1,364
00:24:21	0,00	5,75		112	1,12	1,328
00:24:29	0,00	5,79		112	1,12	1,292
00:24:36	0,00	5,82		112	1,13	1,257
00:24:44	0,00	5,85		113	1,13	1,223
00:24:52	0,00	5,88		113	1,14	1,188
00:24:59	0,00	5,92		114	1,15	1,154
00:25:07	0,00	5,95		114	1,15	1,120
00:25:14	0,00	5,98		115	1,16	1,087
00:25:22	0,00	6,02		115	1,16	1,053
00:25:30	0,00	6,05		116	1,17	1,021
00:25:37	0,00	6,08		116	1,17	0,988
00:25:45	0,00	6,11		117	1,18	0,955
00:25:52	0,00	6,15		117	1,19	0,924
00:26:00	0,00	6,18		118	1,19	0,892
00:26:07	0,00	6,21		118	1,20	0,860
00:26:15	0,00	6,24		119	1,20	0,829
00:26:22	0,00	6,27		119	1,21	0,799
00:26:30	0,00	6,31		120	1,22	0,768
00:26:37	0,00	6,34		120	1,22	0,738
00:26:44	0,00	6,37		121	1,23	0,708
00:26:52	0,00	6,40		121	1,23	0,678
00:26:59	0,00	6,43		122	1,24	0,649
00:27:07	0,00	6,46		122	1,25	0,619
00:27:14	0,00	6,50		123	1,25	0,590
00:27:22	0,00	6,53		123	1,26	0,562
00:27:29	0,00	6,56		123	1,26	0,533
00:27:36	0,00	6,59		124	1,27	0,505
00:27:44	0,00	6,62		124	1,28	0,477
00:27:51	0,00	6,65		125	1,28	0,450
00:27:58	0,00	6,68		125	1,29	0,422
00:28:06	0,00	6,71		126	1,29	0,395
00:28:13	0,00	6,75		126	1,30	0,368
00:28:20	0,00	6,78		127	1,31	0,342
00:28:28	0,00	6,81		127	1,31	0,315
00:28:35	0,00	6,84		128	1,32	0,290
00:28:42	0,00	6,87		128	1,32	0,264
00:28:49	0,00	6,90		129	1,33	0,238
00:28:57	0,00	6,93		129	1,34	0,213
00:29:04	0,00	6,96		129	1,34	0,188
00:29:11	0,00	6,99		130	1,35	0,163
00:29:18	0,00	7,02		130	1,35	0,140
00:29:26	0,00	7,05		131	1,36	0,115
00:29:33	0,00	7,08		131	1,37	0,091
00:29:40	0,00	7,11		132	1,37	0,068
00:29:47	0,00	7,14		132	1,38	0,044
00:29:54	0,00	7,17		133	1,38	0,022
00:30:01	0,00	7,20		133	1,39	0,000
00:30:09	0,00	7,23		134	1,40	-0,022
00:30:16	0,00	7,26		134	1,40	-0,043

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:30:23	0,00	7,29		134	1,41	-0,063
00:30:30	0,00	7,32		135	1,41	-0,083
00:30:37	0,00	7,35		135	1,42	-0,103
00:30:44	0,00	7,38		136	1,43	-0,123
00:30:51	0,00	7,41		136	1,43	-0,143
00:30:58	0,00	7,44		137	1,44	-0,162
00:31:05	0,00	7,47		137	1,44	-0,181
00:31:12	0,00	7,50		138	1,45	-0,201
00:31:19	0,00	7,53		138	1,46	-0,220
00:31:26	0,00	7,56		138	1,46	-0,238
00:31:33	0,00	7,59		139	1,47	-0,257
00:31:41	0,00	7,61		139	1,48	-0,276
00:31:47	0,00	7,64		140	1,48	-0,294
00:31:54	0,00	7,67		140	1,49	-0,313
00:32:01	0,00	7,70		141	1,49	-0,331
00:32:08	0,00	7,73		141	1,50	-0,349
00:32:15	0,00	7,76		141	1,51	-0,368
00:32:22	0,00	7,79		142	1,51	-0,386
00:32:29	0,00	7,82		142	1,52	-0,403
00:32:36	0,00	7,84		143	1,53	-0,421
00:32:43	0,00	7,87		143	1,53	-0,439
00:32:50	0,00	7,90		144	1,54	-0,456
00:32:57	0,00	7,93		144	1,54	-0,474
00:33:04	0,00	7,96		144	1,55	-0,491
00:33:11	0,00	7,99		145	1,56	-0,508
00:33:18	0,00	8,02		145	1,56	-0,526
00:33:25	0,00	8,04		146	1,57	-0,543
00:33:31	0,00	8,07		146	1,58	-0,559
00:33:38	0,00	8,10		146	1,58	-0,577
00:33:45	0,00	8,13		147	1,59	-0,594
00:33:52	0,00	8,16		147	1,59	-0,610
00:33:59	0,00	8,18		148	1,60	-0,627
00:34:06	0,00	8,21		148	1,61	-0,643
00:34:12	0,00	8,24		149	1,61	-0,660
00:34:19	0,00	8,27		149	1,62	-0,676
00:34:26	0,00	8,29		149	1,63	-0,692
00:34:33	0,00	8,32		150	1,63	-0,709
00:34:40	0,00	8,35		150	1,64	-0,725
00:34:46	0,00	8,38		151	1,65	-0,741
00:34:53	0,00	8,40		151	1,65	-0,757
00:35:00	0,00	8,43		151	1,66	-0,773
00:35:07	0,00	8,46		152	1,66	-0,789
00:35:17	0,00	8,50		152	1,67	-0,812
00:35:23	0,00	8,53		153	1,68	-0,828
00:35:33	0,00	8,57		153	1,69	-0,851
00:35:40	0,00	8,60		154	1,70	-0,867
00:35:47	0,00	8,62		154	1,70	-0,882
00:35:57	0,00	8,66		155	1,71	-0,905
00:36:04	0,00	8,69		155	1,72	-0,920
00:36:13	0,00	8,73		156	1,73	-0,943
00:36:20	0,00	8,76		156	1,74	-0,958
00:36:30	0,00	8,80		157	1,74	-0,980
00:36:40	0,00	8,84		157	1,75	-1,003
00:36:50	0,00	8,88		158	1,76	-1,025
00:37:00	0,00	8,92		159	1,77	-1,047
00:37:10	0,00	8,96		159	1,78	-1,068

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:37:20	0,00	9,00		160	1,79	-1,090
00:37:29	0,00	9,03		160	1,80	-1,112
00:37:39	0,00	9,07		161	1,81	-1,133
00:37:49	0,00	9,11		162	1,82	-1,155
00:37:59	0,00	9,15		162	1,83	-1,176
00:38:09	0,00	9,19		163	1,84	-1,197
00:38:18	0,00	9,23		163	1,85	-1,217
00:38:28	0,00	9,27		164	1,86	-1,238
00:38:38	0,00	9,31		164	1,87	-1,259
00:38:48	0,00	9,35		165	1,88	-1,279
00:38:57	0,00	9,38		166	1,89	-1,300
00:39:07	0,00	9,42		166	1,90	-1,320
00:39:17	0,00	9,46		167	1,91	-1,340
00:39:26	0,00	9,50		167	1,92	-1,360
00:39:36	0,00	9,54		168	1,93	-1,380
00:39:46	0,00	9,58		168	1,94	-1,399
00:39:55	0,00	9,61		169	1,95	-1,419
00:40:00	0,00	9,63		169	1,95	-1,432
00:40:00	Fire brigade is alarmed					
00:40:09	0,00	9,67		170	1,96	-1,447
00:40:19	0,00	9,71		170	1,97	-1,466
00:40:28	0,00	9,74		171	1,98	-1,486
00:40:38	0,00	9,78		171	1,99	-1,505
00:40:47	0,00	9,82		172	2,00	-1,523
00:40:57	0,00	9,85		173	2,01	-1,542
00:41:06	0,00	9,89		173	2,02	-1,561
00:41:16	0,00	9,93		174	2,03	-1,579
00:41:25	0,00	9,97		174	2,04	-1,598
00:41:35	0,00	10,00		175	2,05	-1,616
00:41:44	0,00	10,04		175	2,06	-1,635
00:41:53	0,00	10,08		176	2,07	-1,653
00:42:03	0,00	10,11		176	2,08	-1,671
00:42:12	0,00	10,15		177	2,09	-1,689
00:42:22	0,00	10,19		178	2,10	-1,707
00:42:31	0,00	10,22		178	2,11	-1,724
00:42:40	0,00	10,26		179	2,12	-1,742
00:42:50	0,00	10,29		179	2,14	-1,760
00:42:59	0,00	10,33		180	2,15	-1,777
00:43:08	0,00	10,37		180	2,16	-1,794
00:43:17	0,00	10,40		181	2,17	-1,811
00:43:27	0,00	10,44		181	2,18	-1,829
00:43:36	0,00	10,47		182	2,19	-1,846
00:43:45	0,00	10,51		182	2,20	-1,863
00:43:54	0,00	10,54		183	2,21	-1,879
00:44:04	0,00	10,58		183	2,22	-1,896
00:44:13	0,00	10,62		184	2,23	-1,913
00:44:22	0,00	10,65		184	2,24	-1,929
00:44:31	0,00	10,69		185	2,25	-1,946
00:44:40	0,00	10,72		185	2,26	-1,962
00:44:49	0,00	10,76		186	2,27	-1,978
00:44:59	0,00	10,79		186	2,28	-1,994
00:45:08	0,00	10,83		187	2,29	-2,010
00:45:17	0,00	10,86		187	2,30	-2,026
00:45:26	0,00	10,90		188	2,31	-2,042
00:45:35	0,00	10,93		189	2,32	-2,058
00:45:44	0,00	10,96		189	2,33	-2,074

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:45:53	0,00	11,00		190	2,34	-2,089
00:46:02	0,00	11,03		190	2,35	-2,105
00:46:11	0,00	11,07		191	2,36	-2,120
00:46:20	0,00	11,10		191	2,37	-2,135
00:46:29	0,00	11,14		192	2,38	-2,150
00:46:38	0,00	11,17		192	2,39	-2,166
00:46:47	0,00	11,20		193	2,40	-2,180
00:46:56	0,00	11,24		193	2,41	-2,196
00:47:05	0,00	11,27		194	2,42	-2,210
00:47:14	0,00	11,31		194	2,43	-2,225
00:47:23	0,00	11,34		195	2,44	-2,240
00:47:32	0,00	11,37		195	2,45	-2,254
00:47:41	0,00	11,41		196	2,46	-2,269
00:47:50	0,00	11,44		196	2,47	-2,283
00:47:58	0,00	11,47		197	2,48	-2,298
00:48:07	0,00	11,51		197	2,49	-2,312
00:48:13	0,00	11,53		197	2,50	-2,321
00:48:13	Critical condition in room 'Part II': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:48:22	0,00	11,56		198	2,51	-2,335
00:48:31	0,00	11,60		198	2,52	-2,349
00:48:40	0,00	11,63		199	2,53	-2,363
00:48:48	0,00	11,66		199	2,54	-2,377
00:48:57	0,00	11,69		200	2,55	-2,391
00:49:06	0,00	11,73		200	2,56	-2,404
00:49:15	0,00	11,76		201	2,57	-2,418
00:49:24	0,00	11,79		201	2,58	-2,431
00:49:32	0,00	11,83		202	2,59	-2,445
00:49:41	0,00	11,86		202	2,60	-2,458
00:49:50	0,00	11,89		203	2,62	-2,471
00:49:58	0,00	11,92		203	2,63	-2,484
00:50:07	0,00	11,96		204	2,64	-2,497
00:50:16	0,00	11,99		204	2,65	-2,510
00:50:25	0,00	12,02		205	2,66	-2,523
00:50:33	0,00	12,05		205	2,67	-2,536
00:50:42	0,00	12,08		205	2,68	-2,548
00:50:51	0,00	12,12		206	2,69	-2,561
00:50:59	0,00	12,15		206	2,70	-2,573
00:51:08	0,00	12,18		207	2,71	-2,585
00:51:16	0,00	12,21		207	2,72	-2,598
00:51:25	0,00	12,24		208	2,73	-2,609
00:51:34	0,00	12,28		208	2,74	-2,621
00:51:42	0,00	12,31		209	2,75	-2,632
00:51:51	0,00	12,34		209	2,76	-2,644
00:51:59	0,00	12,37		210	2,77	-2,655
00:52:08	0,00	12,40		210	2,78	-2,666
00:52:16	0,00	12,43		211	2,79	-2,677
00:52:25	0,00	12,47		211	2,80	-2,688
00:52:33	0,00	12,50		211	2,82	-2,699
00:52:36	0,00	12,51		212	2,82	-2,703
00:52:36	Critical condition in room 'Part I': Heat radiation from smoke layer greater than 2,5 kW/m²					
00:52:45	0,00	12,54		212	2,83	-2,714
00:52:53	0,00	12,57		213	2,84	-2,724
00:53:02	0,00	12,60		213	2,85	-2,735
00:53:10	0,00	12,63		213	2,86	-2,746

Part II

Time	Smoke room [dB/m]	Smoke layer [dB/m]	Floor layer [m]	Layer temp. [ºC]	Heat radiation [kW/m²]	Floor pressure [N/m²]
00:53:19	0,00	12,66		214	2,87	-2,756
00:53:27	0,00	12,69		214	2,88	-2,767
00:53:36	0,00	12,72		215	2,89	-2,777
00:53:44	0,00	12,76		215	2,90	-2,788
00:53:53	0,00	12,79		216	2,91	-2,798
00:54:01	0,00	12,82		216	2,92	-2,809
00:54:09	0,00	12,85		217	2,94	-2,819
00:54:18	0,00	12,88		217	2,95	-2,829
00:54:26	0,00	12,91		217	2,96	-2,839
00:54:34	0,00	12,94		218	2,97	-2,849
00:54:43	0,00	12,97		218	2,98	-2,859
00:54:51	0,00	13,00		219	2,99	-2,869
00:55:00	0,00	13,03		219	3,00	-2,879
00:55:00	Fire brigade arrived, preparing extinguishing					
00:55:08	0,00	13,06		220	3,01	-2,889
00:55:16	0,00	13,09		220	3,02	-2,899
00:55:25	0,00	13,12		221	3,03	-2,909
00:55:33	0,00	13,15		221	3,04	-2,919
00:55:41	0,00	13,18		221	3,05	-2,929
00:55:49	0,00	13,21		222	3,06	-2,938
00:55:58	0,00	13,24		222	3,07	-2,948
00:56:00	0,00	13,25		222	3,08	-2,951
00:56:00	Fire brigade ready, extinguishing started					
00:56:08	0,00	13,28		223	3,09	-2,960
00:56:16	0,00	13,31		223	3,10	-2,969
00:56:24	0,00	13,34		224	3,11	-2,979
00:56:32	0,00	13,36		224	3,12	-3,080
00:56:32	Fire is declining					
00:56:42	0,00	13,40		224	3,13	-3,370
00:56:51	0,00	13,43		225	3,14	-3,627
00:57:01	0,00	13,46		225	3,14	-3,857
00:57:10	0,00	13,49		225	3,14	-4,066
00:57:20	0,00	13,52		225	3,15	-4,259
00:57:30	0,00	13,55		225	3,15	-4,438
00:57:39	0,00	13,57		225	3,15	-4,606
00:57:49	0,00	13,60		225	3,14	-4,763
00:57:58	0,00	13,62		225	3,14	-4,911
00:58:08	0,00	13,65		225	3,14	-5,052
00:58:17	0,00	13,67		225	3,13	-5,187
00:58:27	0,00	13,69		224	3,13	-5,315
00:58:36	0,00	13,71		224	3,12	-5,438
00:58:46	0,00	13,73		224	3,12	-5,557
00:58:56	0,00	13,75		224	3,11	-5,672
00:59:05	0,00	13,77		223	3,10	-5,782
00:59:15	0,00	13,78		223	3,09	-5,890
00:59:24	0,00	13,80		223	3,08	-5,995
00:59:34	0,00	13,81		222	3,07	-6,097
00:59:43	0,00	13,82		222	3,06	-6,196
00:59:53	0,00	13,83		221	3,05	-6,293
01:00:00	0,00	13,84		221	3,04	-6,359
01:00:00	MAX. CALCULATION TIME - CALCULATION ABORTED!					

Hooton Bio Power Project

Fire Safety Strategy Report

Project:	Project No.	2031
Hooton Bio Power Project	Document No.	2031.M0.J01.001
	Revision:	2
	First issue:	October, 2018
	Last update	December, 2018

Rev:	Date:	Description:	Remarks:
0	2018.10.17	First issue	For comments
1	2018.10.22	Project name changed	For comments
2	2018.12.10	Internal reviewed	For comments

Issued by:

Carsten Hald
Lead Engineer Fire Safety

Reviewed by:

Andreas Karhula Lauridsen
General Manager
Engineering

List of Contents

1. Introduction

1.1 General

This fire safety strategy report is issued for the development Hooton Bio Power Project waste fueled Power Plant. The Hooton Bio Power Project is located in the Hooton Park Industrial Estate in Eastham, Wirral.

The postal address is:
Hooton Bio Power Project
North Road
Eastham
Wirral
CH65 1AJ

Adjacent property to the Hooton Bio Power Project is the Eastham Oil Refinery which surround the Power Plant site to the West, South and East. Located to the North of the Power Plant site is the Manchester Ship Canal. The total size of the site is approx.10 hectares.

1.2 Purpose group

The purpose of this fire safety strategy report is to outline the fire safety features for the power plant incorporating both life safety and property protection features.

In general the Power Plant will be used for generating power and is classified as Purpose Group 6 – Industrial, according to Approved Document B vol. 2, table D1

The Administration building is classified as Purpose Group 3 – Office, according to Approved Document B vol. 2, table D1 and must meet the requirements of BR2010.

The Power Plant Electrical annex & Service building (compartmentation of the main building) is a mix of uses of Purpose Group 3 – Office and Purpose Group 6 – Industrial.

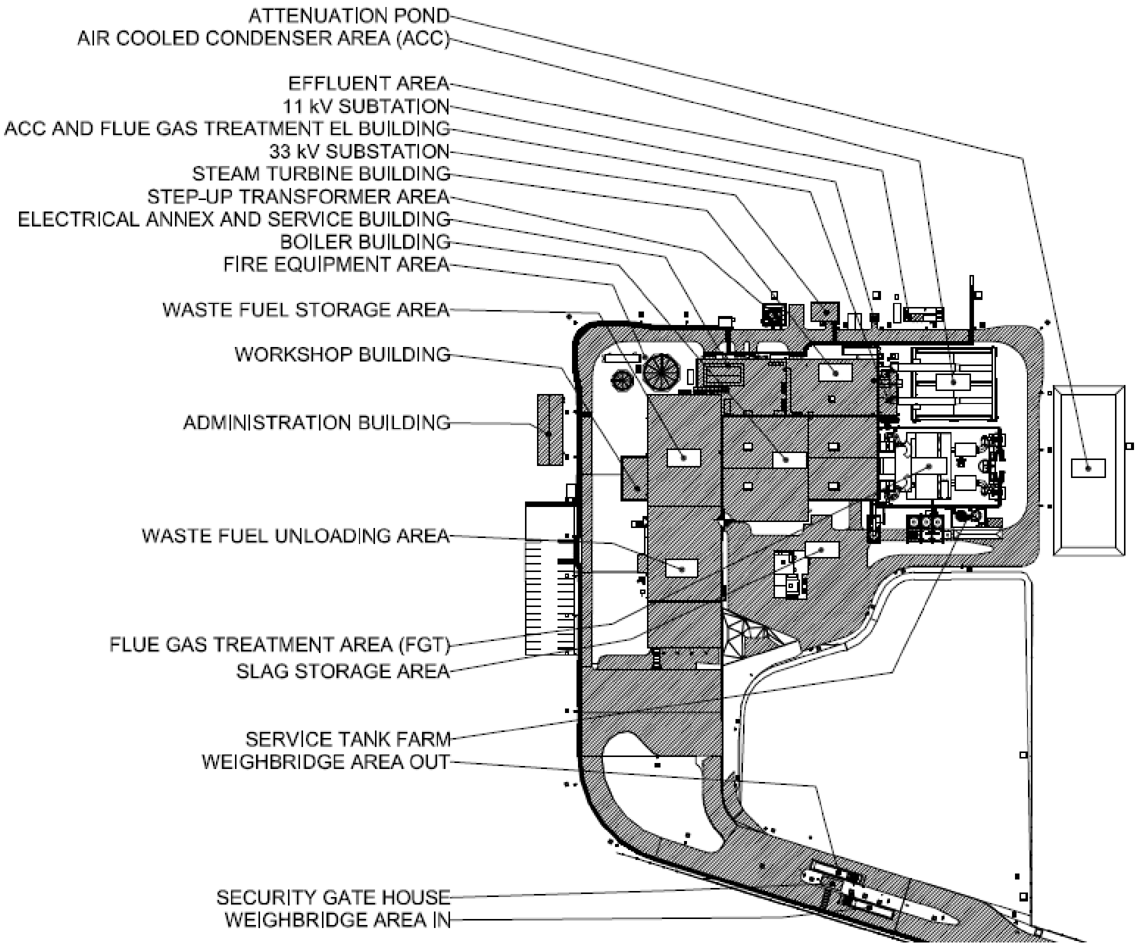
To demonstrated the fulfilment of the functional requirements, the BR2010, BS 9999:2017 and NFPA101:2018 will be used and referred to, where applicable.

With a project of this nature there are additional fire safety features that are recommended for incorporation to limit the potential for loss of productivity and property in the event of fire. In this regard the employer's specification, Insurers requirements and the application of NFPA 850 are described in section 16.

1.3 Building Occupancy

The total occupancy of the Power Plant during normal operation is estimated to be maximum 30 people including operatives and fuel delivery drivers.

1.4 Layout of the Power Plant



The following abbreviations (KKS ID) for the buildings will be used throughout this report:

KKS ID	Building
UAA	33kV Substation
UAB	11kV Substation
UBB	El Annex & Service Building
UBT	Step-Up Transformer Area
UBV	ACC & Flue Gas Treatment El Building
UEA	Waste Fuel Unloading Area
UEB	Waste Fuel Storage Area
UEK	Service Tank Farm
UEW	Slag Storage Area
UGU	Effluent Area
UHA	Boiler Building

UMA	Steam Turbine Building
UMC	Air Cooled Condenser Area (ACC)
USG	Fire Equipment Area
UST	Workshop Building
UVT	Flue Gas Treatment Area (FGT)
UYC	Administration Building
UYE	Weighbridge Area In
UYF	Security Gate House
UYX	Weighbridge Area Out
UZM	Attenuation Pond

1.5 Plant description

The Hooton Bio Power Project is a dual line waste to energy Power Plant, which at full load, generate approximately 24 MW electrical power to the grid. The fuel for the Power Plant will be a mix of e.g. municipal waste and industrial waste (refer to the Feedstock Specification). The Power Plant infeed fuel requirement at full load is some 30 tonnes per hour (15 tonnes per hour per line).

The Power Plant is designed to provide an enclosed process, from delivery, processing and storage of the feedstock, steam production in the boiler to the steam turbine generator set and finally electrical distribution.

Fuel is delivered to the Waste Fuel Unloading Area (Feedstock receiving area) and unloaded into the reception bunker by truck. From here it will be transferred by crane into one of two shredders which reduce any received fuel to a homogeneous size. From the shredders the fuel is screened for non-combustible materials followed by conveying it to the Waste Fuel Storage Area (Feedstock storage area). In the waste fuel bunker the fuel is mixed and finally transferred to the receiving hoppers for the boilers for combustion.
Combustion gas provides the heat to the boiler which produces steam for the steam-turbine-generator set producing electricity.

2. Relevant Legislation

2.1 Building Regulations 2010 (BR2010)

With regard to fire related issues, Hooton Bio Power Project must be demonstrated to achieve compliance with the Building Regulations 2010. For partly guidance in achieving compliance, the Approved Documents has been used.

2.1.1 Approved Document B (ADB)

It should be observed that the ADB is not legislative and provides only one method by which BR2010 compliance can be achieved.

The “Use of Guidance” section of ADB states that:
“*The Approved Documents are intended to provide guidance for some or more common building situations. However, there may well be alternative ways of achieving compliance with the requirements.* ***Thus there is no obligation to adopt any particular solution contained in an Approved Document if you prefer to meet the relevant requirement in some other way.***”

Therefore BR2010 may be demonstrated to have been satisfied by:

- Compliance with the prescriptive guidance contained in the ADB, BS 9999, CIBSE Guide E or any other associated documents referenced therein; or
- A fire engineered solution that is demonstrated to provide an acceptable level of protection to the occupants of the building, by use of the guidance of BS 7974, its associated published documents and/or any other relevant engineering documentation; or
- The use of one document to supplement the other in support of a fire engineered solution.

Where applicable the design of the Power Plant will be based on the recommendations contained in BS 9999. Where an element of the development cannot be assessed against BS 9999 (for example the boiler building, turbine hall, fuel storage etc.) then appropriate alternative guidance will be applied such as NFPA or a risk engineered approach adopted.

2.2 The Regulatory Reform (Fire Safety) Order 2005 (FSO 2005)

Once the building is completed and handed over to the client, the FSO 2005 becomes the governing legislation. The FSO 2005 replaces legislations such as the Fire Precautions (Workplace) Regulation 1997 and the Fire Precaution Act 1971 and imposes the general duty to take relevant fire precautions to ensure the safety of the building users and those in the vicinity.

As mentioned in the FSO 2005, the responsible person is required to carry out a risk assessment of the premises which must suitable and sufficient for the risk and exposure of the occupants to such risks.

In the FSO 2005 “responsible person” means—

(a) in relation to a workplace, the employer, if the workplace is to any extent under his control;
(b) in relation to any premises not falling within paragraph (a)—
    (i) the person who has control of the premises (as occupier or otherwise) in connection with the carrying on by him of a trade, business or other undertaking (for profit or not); or
    (ii) the owner, where the person in control of the premises does not have control in connection with the carrying on by that person of a trade, business or other undertaking.

The order also places responsibility on the relevant person for the servicing and maintenance of all fire safety systems throughout the life of the building.

2.3 Construction (Design and Management) Regulations 2015

Under the Construction (Design and Management) Regulations 2015 (CDM) designers are required to minimize or design out hazards.

2.4 Construction Phase Plan and Health and Safety Manual

During the construction phase the Regulatory Reform (Fire Safety) Order 2005 and the Construction (Design and Management) Regulations 2015 comes into act as well. Please refer to the latest revision of the 2031.TM.101.001 – Construction Phase Plan and 6000.QP.100.0006 BWSC Health and Safety Manual.

3. Supplementary Fire Safety Recommendations

3.1 Adopted Guidance's

In addition to the scope of BR2010 there is a requirement to minimize the potential for loss of production and loss of capital investment in the event of fire. International standards will be adopted for particular risk items (ref. section 16)

The provision of additional fire safety measures is incorporated into the fire safety strategy as a whole and provides an integrated fire safety regime for the Power Plant.

The following guidance has been adopted in this report:

- Employer's Specification, room data sheets etc.
- Guidance Document, Waste Processing Plant – Fire Systems, Issue 2.0, dated 19 May 2017(*1)
- Guidance Document, Energy from Waste – Fire Systems, Issue 3.0, dated 19 May 2017(*1)
- NFPA850 - Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations.

(*1) Deviation: Sprinklers in the main Feedstock receiving and storage area is not required

4. Risk Profiles – BS 9999

Central to the application of the recommendations contained within BS 9999 is a risk assessment of all buildings within the premises recommended to be carried out to determine the risk profile or profiles, as different areas might result in different risk profiles. The risk profiles indicate the potential for fire risk to the building occupants and are used in the design of e.g. fire safety systems, compartmentation, means of escape etc.

Risk profiles are given as a combination of occupancy characteristic and fire growth rate.

4.1 Occupancy characteristic

Ref. table 2
The occupancy characteristic covering all areas within the premises is determined in accordance with Table 2 to be: Occupancy (including people with disabilities) characteristic A
Based on the following:

- Occupants who are awake and familiar with the building
- Office and Industrial premises

Further, the Power Plant occupants will be aware of the fire safety provisions and precautions and visitors including contractors to the site will be accompanied and/or inducted in order to maintain characteristic A.

4.2 Fire growth rate

Ref. table 3
The fire growth rate is the rate at which it is estimated that a fire will grow. The fire growth rates are divided into four categories 1 to 4 as per the following:

Category	Fire growth rate	Fire growth parameter (kJ/s^3)
1	Slow	0.003
2	Medium	0.012
3	Fast	0.047
4	Ultra-fast	0.188

Within table 3 – Descriptions, various types of combustible and flammable materials are listed for each category, as well as Typical examples of commodities

Additionally to assist in determining the fire growth parameter for the various areas the following document has been consulted: 11th IAFSS Symp. pp. 517-530

4.3 Risk profile

The following table indicates the risk profiles allocated to each of the main areas of the Power Plant:

Area	KKS	Risk profile	Comment / Fire growth parameter [kJ/s^3]
33kV Substation - Dry-type transformer	UAA	A1	(2) ~0,0009 (<0,002)
11kV Substation - Dry-type transformer	UAB	A1	(2) ~0,0009 (<0,002)
El Annex & Service Building	UBB	Mixed	Mixed
- Electrical rooms		A1	(2) ~0,0029 (<0,012)
- Compressor room		A1	(2) ~0.00803 (<0,012)
- Control room		A1	(2) ~0,00883 (<0,012)
- Spare part storage		A2	(2) ~0,0232 (<0,047)

room			
Step-Up Transformer Area	UBT	A2 (3)	(1)
ACC & Flue Gas Treatment El Building	UBV	A1	(2) ~0,0029 (<0,012)
Waste Fuel Unloading Area	UEA		(7) Recommended storage time for waste
- Bunker		A3 (5)	(1)
- Tipping hall		A3 (3)	(1)
Waste Fuel Storage Area	UEB		(7) Recommended storage time for waste
- Shredder (hopper)		A3 (3)	
- Shredder		A3 (3)	
- Bunker		A3 (4)(5)	(1)
- Boiler feed hopper		A3 (3)	
Service Tank Farm - Diesel oil (combustible liquid with flash point at or above 37.8°C),	UEK	A3	(1)
Slag Storage Area	UEW	NA	
Effluent Area	UGU	NA	
Boiler Building	UHA	A1	Except for the boiler front and the area for the auxiliary burners, the building holds none or limited amount of combustible materials.
Boiler building boiler front and auxiliary burner area.	UHA	A3 (3)(4)	(1)(6)
Turbine Building.	UMA	A3 (3)	(1)(6)
Air Cooled Condenser Area (ACC)	UMC	A1	(2) ~0,0029 (<0,012)
Fire Equipment Area	USG	A2 (3)	(1)
Workshop Building	UST	A2	(2) ~0,0171 (<0,047)
Flue Gas Treatment Area (FGT)	UVT	NA	
Administration Building	UYC	A2	(1)
Weighbridge Area In	UYE	NA	
Security Gate House	UYF	A2	(1)
Weighbridge Area Out	UYX	NA	
Attenuation Pond	UZM	NA	

(1)/(2)/(6)	Fire growth rate (kW/s^2). (1) The fire growth rates are based on BS 9999, table 2 and table 3 (2) The fire growth rates are based the 11th IAFSS Symp. pp. 517-530 (6) Category considered high due to the possible quantities of combustible liquids.	
(3)	Areas are installed with fixed fire suppression system at risk areas. The risk profile has typically been reduced accordingly to the level indicated.	
(4)	Conveyor leading out of or into the building is installed with a fixed fire suppression system.	
(5)	Fire water monitors are installed to cover the area. The fire water monitors will be located to allow for coverage of all pit areas with two (2) streams operating simultaneously. The risk profile has not been reduced.	
(7)	Combustible waste type	Max. storage time
	Non-shredded or similarly treated wastes (that is wastes whose particle size has not been reduced)	6 month

	Baled and compacted wastes	6 month
	Shredded and similarly treated wastes (that is wastes whose particle size has been reduced)	3 month
	Combustible fines/dusts and very small particle size wastes	1 month
	Ref. *WASTE 28 Reducing fire risk at waste management sites issue 2 – April 2017*	

Means of escape provisions are assessed in the following sections using the above risk profiles where appropriate for the area concerned.

5. Means of warning

5.1 Requirements

Ref. ADB (Part B of Schedule 1 to the Building Regulations 2010)
B1,-
The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.

5.2 Fire detection and alarm system

A fire detection system is installed for monitoring the power plant. The fire detection system shall -

1) by means of the installed visual and audible devices, alert occupants for evacuation of the area in which the detection system is activated.
2) inform the plant operator about location in which the detection system is activated for immediate action (firefighting, require assistance etc.) to prevent a possible fire to develop.

The fire detection system comprises the following main elements:

- a main fire alarm panel
- a mimic panel for the fire department for easy identification of the area in which the detection system is activated. The mimic panel will be located in the gate house (to be agreed with the local Fire Authority)
- fire control panels
- fire detectors and visual and audible alarm devices.

The following fire detection and alarm provisions are to be included as part of the fire safety measures:

Area	KKS	Manual call point	Automatic detection	Alarm
33kV Substation	UAA	Yes	Yes	Yes
11kV Substation	UAB	Yes	Yes	Yes
El Annex & Service Building	UBB	Yes	Yes	Yes
Step-Up Transformer Area	UBT	Yes	Glass bulb (sprinkler release)	Yes
ACC & Flue Gas Treatment El Building	UBV	Yes	Yes	Yes
Waste Fuel Unloading Area	UEA	Yes	Yes (CO monitoring and thermal camera)	Yes
Waste Fuel Storage Area	UEB	Yes	Yes (CO monitoring and thermal camera)	Yes
Service Tank Farm	UEK	Yes	Yes	Yes
Slag Storage Area	UEW	None	None	None

Effluent Area	UGU	None	None	None
Boiler Building	UHA	Yes	Yes	Yes
Turbine Building.	UMA	Yes	Yes	Yes
Air Cooled Condenser Area (ACC)	UMC	None	None	None
Fire Equipment Area	USG	Yes	Yes	Yes
Workshop Building	UST	Yes	Yes	Yes
Flue Gas Treatment Area (FGT)	UVT	Yes	Yes	Yes
Administration Building	UYC	Yes	Yes	Yes
Weighbridge Area In	UYE	None	None	None
Security Gate House	UYF	Yes	Yes	Yes
Weighbridge Area Out	UYX	None	None	None
Attenuation Pond	UZM	None	None	None

Fire detection and alarm systems are to be designed in accordance with BS5839 Pt 1. Manual call points provided at all storey and final exits, plant stair landings and as required to limit the travel distance to the nearest call point to 30 m.

The following categories of detection and alarm are considered appropriate:

- Administration and ancillary areas (offices etc.). – L1/P1 (systems installed throughout all areas of the building)
  and,-
- Process and plant areas (Indoor,- boiler building, turbine hall, fuel storage and transportation etc.). – L2/P2 (systems installed only in defined parts of the building)

Note:
Designing the fire detection system to comply with level L2/P2 means that, the detection system will be provided and installed to monitor areas that have been identified as risk areas during review of the plant and carrying out the fire risk assessment. As the fire risk assessment most likely will develop throughout execution of the project and should this call for additional areas to be installed with fire detectors, the fire detection system to be installed will allow for extension.

Automatic detection will be selected to minimise the risk of false alarms caused by ambient conditions (e.g. dust levels in fuel storage areas, shredder areas etc.).

5.3 Battery room

In case of black-out of Power Plant various systems e.g. the DC systems are emergency supplied by the batteries (UPS - Uninterruptable Power Supplies) located in the battery room.
Small amounts of hydrogen gas are released during charging of the batteries. As hydrogen gas is flammable with a lower explosive limit of 4 vol. % and an upper explosive limit of 75 vol. %, an explosive mixture with air may form if the room is not sufficiently ventilated.

Battery room - Unclassified
To maintain the hydrogen concentration below the lower explosive limit, the room is subject to monitored ventilation (redundant) with a minimum air exchange rate specified according to BS EN 50272. As the generation of an explosive gas atmosphere will be prevented by the ventilation system, the Battery room is unclassified.

5.4 Fire detectors

The following table provides an indication of the type of detection available to be used depending on perceived risk in the various areas:

Detector type:	Installation area:	Applicable for areas such as:	Not suitable for detection of:
Heat Detector, fixed temperature	Fog- and Misty Areas, Dusty areas, Smoky areas, Steamy areas. In areas/ zones where a rapid (hot) fire is capable to develop more heat than smoke. Process: Rapid oxidation of materials in the exothermic chemical process of combustion releasing heat (Hot Fire).	Outdoor substations. Generators. Solid fuel handling and storage areas.	Slow (shouldering) fires, Low heat fires
Heat Detector, rate-of-raise	Fog- and Misty Areas, Dusty areas, Smoky areas, Steamy areas. In areas/ zones where a rapid (hot) fire is capable to develop more heat than smoke. Process: Rapid oxidation of materials in the exothermic chemical process of combustion releasing heat (Hot Fire).	Outdoor substations. Generators. Solid fuel handling and storage areas.	Slow (shouldering) fires, Low heat fires
Line heat cable, fixed temperature	Small enclosed areas, cable-trays, tunnels etc. Fog- and Misty Areas, Dusty areas, Smoky areas, Steamy areas. In areas/ zones where a rapid (hot) fire is capable to develop more heat than smoke. Process: Rapid oxidation of materials in the exothermic chemical process of combustion releasing heat (Hot Fires).	Enclosed conveyors, Drag Conveyors, Conveyors, Detection in between electrical cables	Slow (shouldering) fires, Low heat fires
Smoke Detection, Ionisation element	Relative clean, steam and dust-free environments/ areas where a fire will develop a concentration of smoke from material emits as it burns.	Switchgear rooms, Offices, Server and computer rooms	Dusty areas with high air velocity, Steamy areas
Smoke Detection, Optical element	Relative clean, steam and dust-free environments/ areas where a fire will develop a concentration of smoke from material emits as it burns.	Electrical cables and machinery, Plastics, Air-conditioned areas, Computer rooms	Dusty areas, Steamy areas
Aspiration detection combined with CO detection	Aspiration detects smoke generated by flaming or smouldering fires. CO detectors detect and warn about dangerous CO-gas build-up	Very Dusty & Smoky Areas e.g. Open structures. Explosion risk areas. Gas accumulation areas.	
Flame	Flammable gases, Explosion risk areas, Smokeless areas, Areas with air movement, Chemical fires, Fuel handling, Hydrocarbon fires	In areas were an open flaming fire flame is a mixture of reacting gases and solids emitting visible, infrared, and sometimes ultraviolet light, the frequency spectrum of which depends on the chemical composition of the burning material and intermediate reaction products.	Smoky fires, Smouldering fires, Areas with obstructions to line of sight
Smoke optical beam	Ducts, Large open areas, Corridors	Warehouses, Computer room, Turbine halls	Dusty areas, Areas with obstructions to line of sight
Flammable & Explosion Gas Detection	Areas where explosion or flammable gases can occur.	Indoors or outdoors, Ventilation plenums	Areas containing Sulphur, Toxic gas detection

Additional to the detector types mentioned above thermal imaging cameras will be used in areas to assist e.g. identifying a hot area/spot in the storage building.

The level of automatic fire detection and alarm provided exceeds the minimum requirements of the Building Regulations.

The fire control panels (sub-panels) and the mimic panel are connected to the main fire alarm panel located in the Control Room.

The mimic panel will be located in the gate house to provide immediate indication of the system status to any personnel (including firefighting personnel) entering the site.

The fire control panels are located in strategic areas for local monitoring of fire detection and alarm devices. Status information from each of the fire control panels is relayed back to the main fire alarm panel in the Control Room

6. Means of escape

6.1 Requirements

Ref. BS9999:16.1
Escape routes from each storey (or level) should be so sited that a person confronted by fire can turn away and make a safe escape through an alternative exit. Routes of travel should be free from any serious obstacle that could cause undue delay, especially to disabled people, e.g. raised thresholds or steps, or doors that are difficult to open.

6.2 Horizontal travel distances

6.2.1 Horizontal escape

Ref. BS9999
Maximum permissible travel distance according to Table 11:

Risk Profile	Travel Distance, in metres (m)	
	Two-way travel	One-way travel
A1	65	26
A2	55	22
A3	45	18

Further, angle between alternative escape routes should be not less than 45° (ref. BS9999, 16.3.2).

The width of escape routes is according to BS9999: 16.6.2
- Corridors accessible for wheel chair users will be 1,200 mm wide.
- Corridors not accessible for wheel chair users will be 1,000 mm wide.

For Industrial Equipment Access the minimum horizontal width of 560 mm of any walkway, landing or platform, is required based on the provisions of NFPA101 (2018) Table 40.2.5.3.1. This reduced width can be used in the Process areas with no public access, and all obstructions are fixed obstructions.

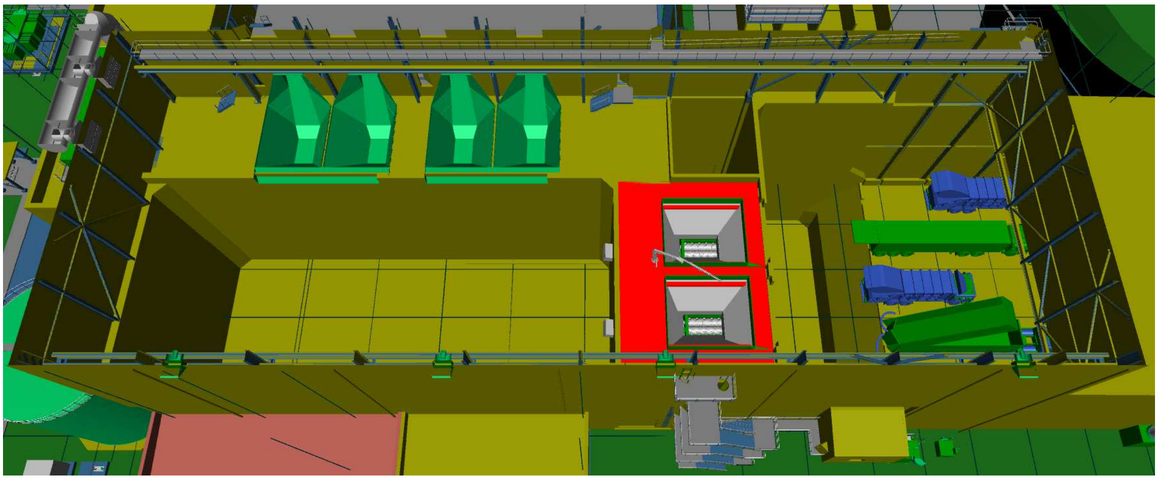
The 560 mm width walkway is restricted to areas adjacent equipment and is limited locations.

Platforms, handrails and stairs shall be designed according to BS EN ISO 14122 and BS5395.

The means of escape drawings for each main area are listed in section 19 and included in the attachment to this report ref. 2031.M0.J01.002 rev.0

6.2.1.1 Waste Fuel Unloading Area and Waste Fuel Storage Area

The waste fuel unloading area and the fuel storage area are located within the same building and as such in open connection. The building is a single storey building holding the bunker for the received fuel, the reviewing hoppers for the shredders, the bunker for the shredded fuel and the infeed hoppers for the boilers. Located within the building is a separate concrete structure (min. 120 minutes fire rated – marked red on the figure below) which serves to enclose the shredders and electrical rooms. Access to the shredders and the electrical room is either from the outdoor staircase or the boiler building.

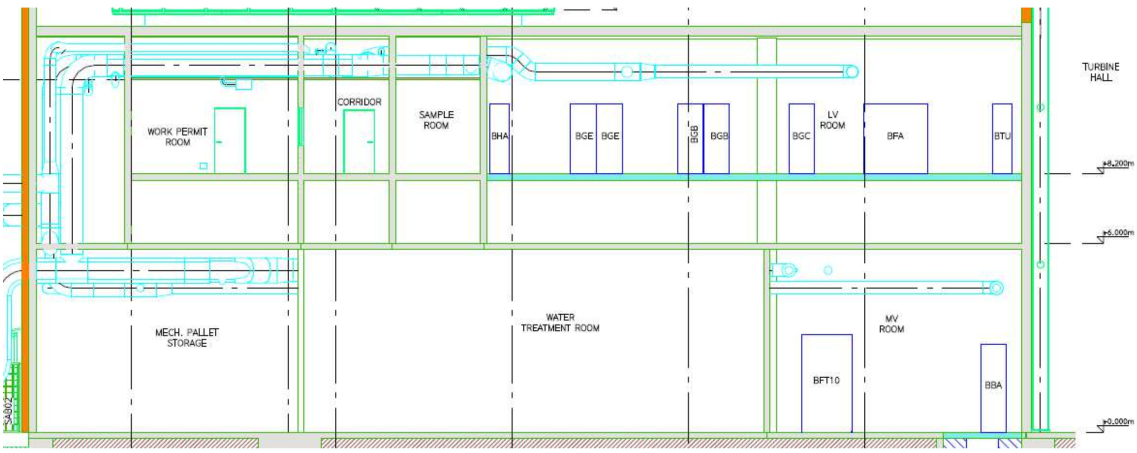


Access into either the waste fuel unloading bunker or the fuel storage bunker is not anticipated required at any time. Consequently no means of escape for these areas will be provided.

6.2.2 Vertical escape - buildings

6.2.2.1 Electrical El Annex & Service Building - UBB

The Electrical El Annex & Service Building is a two storey building (ground floor and 1st floor). Located at 1st floor is the LV Room which is installed with a raised floor (void space height 2.0 m) covering the complete footprint of the room. Any access beneath the raised floor for maintenance will be provided by means of movable ladders. Access shall be supervised and carried out according to Confined Space Regulations 1997.

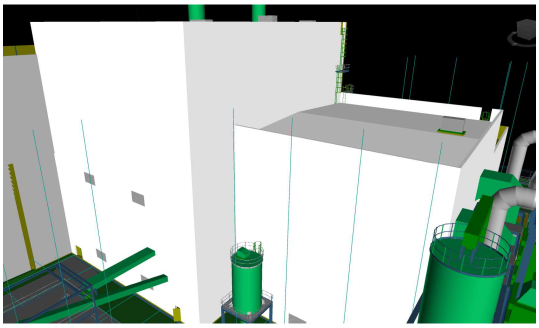


6.2.2.2 Administration building - UYC

The administration building is a single storey building. Vertical escape is not applicable.

6.2.2.3 Boiler building - UHA

The Boiler building is one single storey building with a number of access galleries - the highest of which is some 33.6 m above ground level. Due to the design of the boiler, the building will hold two roof levels as indicated below.

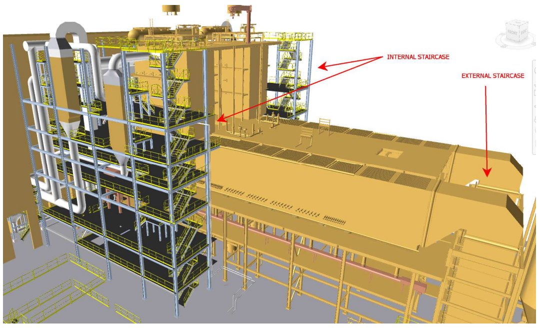


For the highest of the building all main galleries from level +33.600 to ground level +0.000 are vertically linked by means of two internal access and egress stairs (open staircase) positioned on either side of the boiler (north and south). An external access and egress stair (open staircase) is installed at the east end of the lover part of the building serving all main galleries from levels +20.000 to ground level.

Additional stair links are provided between vertically adjacent galleries.

The internal stairs discharge within the boiler building at ground level and alternative directions of escape are provided from the base of each stair. These alternative directions of escape could either be directly leading to outside building or leading into a separate 120 minute fire rated compartment which further lead to the outdoor. Discounting one of the stairs (spatial separation of the stairs and the sheer volume of the building mean that one will always be available for use in the event of a fire) there will always be more than adequate capacity for vertical means of escape within the building.

A small number of dead end conditions exist on the boiler galleries but these are of very short distance and the open nature of the galleries ensures rapid detection of any fire event by personnel in the vicinity; the short single direction travel distances are therefore deemed acceptable.



6.2.2.4 Turbine building – UMA

The turbine building is provided with internal open-grate stairs, again spatially separated to maintain the use of at least one in the event of fire.

6.2.2.5 Fuel storage area (boiler infeed hopper area and shredder hopper area) – UEA and UEB

Escape from the boiler infeed hopper area and shredder hopper area is provided by way of one external stair (open staircase) leading to ground level or through the boiler building. The boiler building is a separate 120 minute fire rated compartment.

6.2.3 Storey exit

Ref. BS9999: 16.6

According to table 13 of BS9999 the minimum door width per person should be for:

- Risk profile A1 – minimum 3.3mm. Hence a 800mm door serve 242 occupants
- Risk profile A2 – minimum 3.6mm. Hence a 800mm door serve 222 occupants

- Risk profile A3 – minimum 4.6mm. Hence a 800mm door serve 173 occupants

El annex & Service building – Minimum required exit clearance width 800 mm:
The Electrical El Annex & Service Building two single storey building. Exits doors from the building are a minimum of 800mm wide which offers a capacity of some 222 occupants - exceeding the actual physical capacity of the office storeys.

Administration building – Minimum required exit clearance width 850 mm:
The administration building is a single storey building. Exits from the building are a minimum of 800mm wide. However, disabled persons e.g. wheelchair users must be expected access to the administration building why minimum required exit clearance width 850 mm shall be provided.

Fuel storage area and process areas:
Storey exits from the fuel storage and process areas will be inherently larger than required for the occupancy of the areas due to the requirement for transportation of equipment to and from the areas.

All doors used as exits, whether they are storey or final exits shall be openable by a single simple operation without requiring the use of tools or keys. Doors held closed for security purposes shall freely open in the event of a fire.

6.2.4 Final exits
All final exits shall be designed to lead to a place of ultimate safety away from the building concerned. Final exits shall lead to the place of safety via hard landscaping and the route provided with emergency lighting.

6.2.5 Means of escape for disabled persons
It is not envisaged that there will be disabled operatives in the El annex & Service building, fuel storage or Process areas however the administration building may well have disable occupants or visitors on occasion and the following measures are recommended.

The evacuation of disabled persons is the responsibility of the building operator; no reliance can be placed on or assumed from the fire authority. The critical issue in terms of structural provisions is designing for the means of escape of mobility-impaired persons, in particular wheelchair users. The strategy for this should be rigorously developed in collaboration with the Building Management. It is also necessary to consider all disabilities, and the general principles for designing effective escape for other types of disability are summarised below.

Hearing and visual impairment: Audible alarms will as well as flashing beacons be installed throughout the plant to notify occupants to evacuate the building. Hearing and visual impaired persons should generally be assisted during evacuation of the building. Successful escape for other impaired persons is helped by ensuring legibility of the building – as recommended in BS 8300.

Disabled staff will be encouraged to produce PEEPS (Personal Emergency Egress Plans) in collaboration with the building operator; this will ensure an appropriate resource and response tailored to the individual needs of the disabled person and the specific features of the building itself (the “Building Capability”). PEEPS can also be prepared for the “generic” types of disability, to ensure the best management response for evacuation of non-staff occupants.

As a single storey building, the administration building will not be provided with refuge points.

6.2.6 Inner rooms
The Electrical El Annex & Service Building and the process areas holds rooms that would be classed as ‘inner rooms’; these specific areas are mitigated by limited occupancy (i.e. less than 60 occupants and infrequent use) and the provision of automatic fire detection and alarm inside these rooms and throughout the premises.

6.2.7 Protection of stairways

6.2.7.1 El Annex & Service Building - UBB

Stairways (staircase or ladders) adjoining the external wall of the building and form part of an escape route will be protected for 30 minutes within 1.8 m of the façade.

6.2.7.2 Plant areas: Boiler building - UHA, Turbine building - UMA etc.

Stairways (staircase or ladders) adjoining the external wall of the building and form part of an escape routes is not considered to be protected. Areas for plant and equipment have been assessed in regard to fire risks and suppression systems installed.

6.3 Available Safe Egress Time (ASET) / Required Safe Egress Time (RSET)

RSET

During normal operation of the plant, few occupants will be within the Boiler building. The majority of the operational staff would normally be within the office/control room section which is fire separated from the Boiler building. Maintenance personnel and visitor access will be restricted; maintenance will be under permit to work and the visitors will be briefed before going into the building, and accompanied. The anticipated occupancy during the routine maintenance period will be more than most other times, but will still be acceptably low.

Required Safe Egress Time (RSET)

Safe egress time required is a combination of several components of time ranging from time to detection up to the actual travel time. They include:

- Detection time
- Alarm time
- Pre movement time
- Walking time
- Detection Time (tdet):

This is the time from onset of fire to the detection by an automatic detection system or by the building occupants. Considered here are the type of the detection system, their effectiveness with time and the fire scenario.

The building will be installed with smoke detectors and will automatically relay an alarm on detection of smoke. Visual evidence will aid early detection by occupants working there.

It is expected that the detection of fire will be quick for the fuel types that could be found in the building. Consequently, 1-minute is taken as the operating time for the detectors within the building.

Time to General Alarm (ta):

With the automatic detection system in place the time to general alarm is taken to be zero as the system will trigger the general alarm to the building immediately.

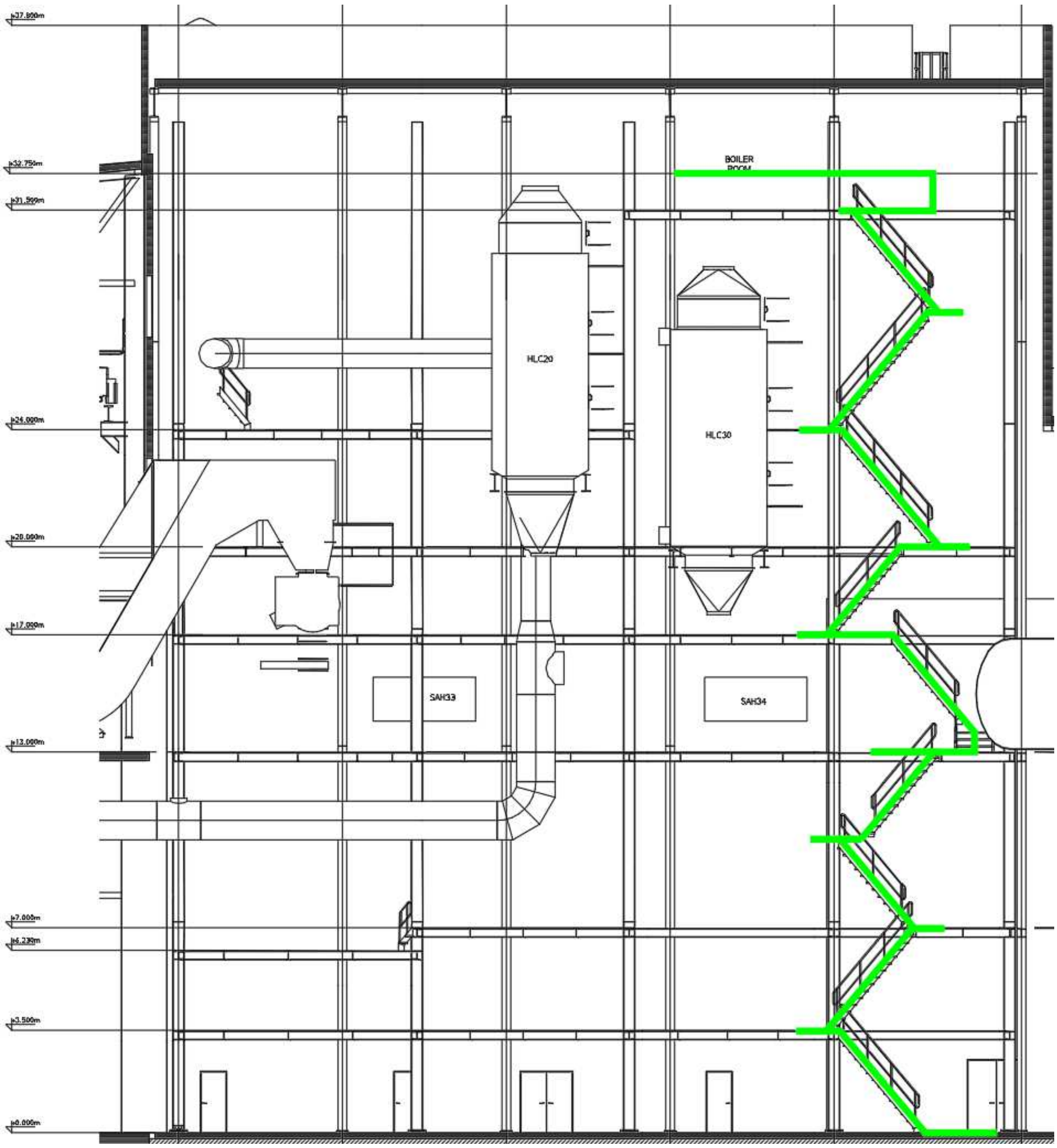
Pre Movement Time (tpre)

For a well-managed enclosure, 1-minute pre movement time for a person to start walking in the building is set.

Travel Time (ttrav)

The travel time, expressed as walking time, is the time required for occupants to walk to an exit that leads to a protected area or final escape exit. The occupants will be escaping from the upper level of the boiler and finally to outside (level +0,000). The occupant numbers are low why crowd is discounted. As per CIBSE guide E – 7.4.1 an average horizontal walking speed of 1.2 m/s and vertical velocity of 0.75 m/s is used.

The maximum travel of 45 m (horizontal) and maximum 41 m (vertical) is identified from the platform level +32.750 to the nearest door leading to a protected area and finally to the outside at level +0,000. The total travel time is approx. 93 seconds.



Calculated Time
The calculated time is therefore:
RSET = tdet + ta + tpre + ttrav
= 60s + 0s + 60s + 93s = 213 seconds (~3 minutes and 33 seconds)

ASET
Available Safe Egress Time (ASET)
The available safe egress time will be calculated based on an oil pool fire sized 3 m in diameter equal to 5.5 MW fire and a fire twice the size equal 11 MW fire (ref. section 19).
ASET = 7 minutes and 40 seconds

RSET <> ASET
RSET (3 minutes and 33 seconds) < ASET (7 minutes and 40 seconds)

7. Emergency lighting

Escape lighting to BS 5266: Part 1 is to be provided following standard guidance in BS 9999 and,-
Emergency light will be provided for critical plant operation areas according to NFPA850; 5.6.2

8. Fire spread

8.1 Internal fire spread

8.1.1 Requirements – Linings
Ref. BR2010
B2,-

1) To inhibit the spread of fire within the building, the internal linings shall:
   a) Adequately resist the spread of flame over their surfaces; and
   b) Have, if ignited, a rate of heat release or a rate of fire growth, which is reasonable in the circumstances.
2) In this paragraph 'internal linings' mean the materials or products used in lining any partition, wall, ceiling or other internal structure.

The classification of the surfaces of the internal walls and ceilings will comply with the requirements of the BS 9999.

These requirements reduce the likelihood of fire spreading in a building due to the combustibility of the internal linings.

The surface linings of the internal walls and ceilings shall comply with the classifications listed below in the following tables (ref. BS9999, table 33)

Table 33 **Classification of linings**[A)]

Location	National class [B)]	European class[C), D)]
Small room of area not exceeding 4 m^2 in a residential building and 30 m^2 in a non-residential building and domestic garages not exceeding 40 m^2	3	D-s3, d2
Other rooms (including garages)	1	C-s3, d2
Circulation spaces within dwellings	1	C-s3, d2
Other circulation spaces [D)] including the common areas of flats	0	B-s3, d2

NOTE Linings which can be effectively tested for "surface spread of flame" are rated for performance by reference to the method specified in BS 476-7:1987, under which materials or products are classified 1, 2, 3 or 4, with Class 1 being the highest. Class 0 is better than Class 1. It is not identified in any BS test standard. A Class 0 product is either:

a) *composed throughout of materials of limited combustibility; or*

b) *a material having a Class 1 surface spread of flame and which has a fire propagation index (I) of not more than 12 and a sub-index (i_1) of not more than 6.*

The fire propagation index is established by reference to the method specified in BS 476-6.

European classifications are described in BS EN 13501-1:2007+A1.

A) Recommendations are given in Clause **33** for linings of concealed voids.

B) The national classifications do not automatically equate with the equivalent classifications in the European column, therefore products cannot typically assume a European class, unless they have been tested accordingly.

C) When a classification includes "s3, d2" this means that there is no limit set for smoke production and/or flaming droplets/particles.

D) Large rooms such as open plan offices, shops display areas and factories need not be regarded as circulation spaces even though there are circulation routes in them.

Note: No lining will be foam based.

8.1.2 Requirements – Structure
Ref. BR2010
B3,-

1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.
2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings.
3) Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken to an extent appropriate to the size and intended use of the building, comprising either or both of the following:
   a) Sub-division of the building with fire resisting construction;
   b) Installation of suitable automatic fire suppression systems
4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited

8.1.2.1 Structure – BS 9999
There are separate requirements for the structural fire performance of the Power Plant in accordance with BS9999, table 25:

- Administration building (single storey): No requirement according to BS9999 30.2.3
- Electrical El Annex & Service Building (ground floor level and 1st floor) - height of top occupied storey 8.6m, unsprinklered: 60 minutes fire resistance for element of structure
- Workshop building (single storey): No requirement according to BS9999 30.2.3
- Boiler Building and Turbine Building (single storey): No requirement according to BS9999 30.2.3
- Fuel storage building (single storey): No requirement according to BS9999: 30.2.3
- Concrete structure holding the shredder (2nd floor), the electrical room (1st floor) and the storage room / reject container (ground floor) - height of top occupied storey 17.7m, unsprinklered: 90 minutes fire resistance for element of structure

Note: Equipment located on other roofs is considered maintenance free during normal operation of the plant. Access to maintenance free equipment is provided, but does not form part of escape routes and will not be fire rated.

8.1.2.2 Structure – Insures requirement
The boiler building, the turbine building and the fuel storage buildings are single storey buildings and not required fire rated as risks inside buildings has been identified and addressed. Identified risks have been installed with fire suppression systems.

8.1.3 Compartmentation – BS 9999 requirements, Table 28
There is no limit on the compartment size for the administration building as the highest occupied storey is less than 30m above ground.

The remainder of the Power Plant:
Single storey buildings within Risk Profile A1, A2 and A3 are not restricted in regard to maximum floor area (no limit).

8.2 External fire spread

Functional Requirement

1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.
2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

8.2.1 Construction of external walls

BS9999 fig. 47 recommends that the external cladding of the building to be provided with Class 1 (national class) or Class C-s3, d2 or better (European class) or better up to a height of 18m above ground for buildings with a height of 18m or more. Above this height BS9999 fig. 47 recommends that the external cladding of the building to be provided with Class 0 (National) / B-s3,d2 (European) or better.

8.2.2 Space separation – Building Regulation requirement

A requirement of the Building Regulations is that the external wall of a building shall adequately resist the spread of fire from one building to another. This is achieved by ensuring that the building under consideration has sufficient spatial separation from adjacent buildings.

For the purposes of life safety the separation between buildings on the same site and subject to the same management regime can usually be ignored (BS9999 35.1.2). It is therefore not proposed to analyse the potential for fire spread between the buildings on site for the purposes of the Building Regulations.

For business continuity and consequential loss limitation in the event of a fire, each major element of the plant is provided with fire separation/isolation. Refer to Section 8.9 for details.

Space separation north façades and west façades towards site boundary

Required distances towards the northern and western boundary are calculated according to the appendix A of BRE187:

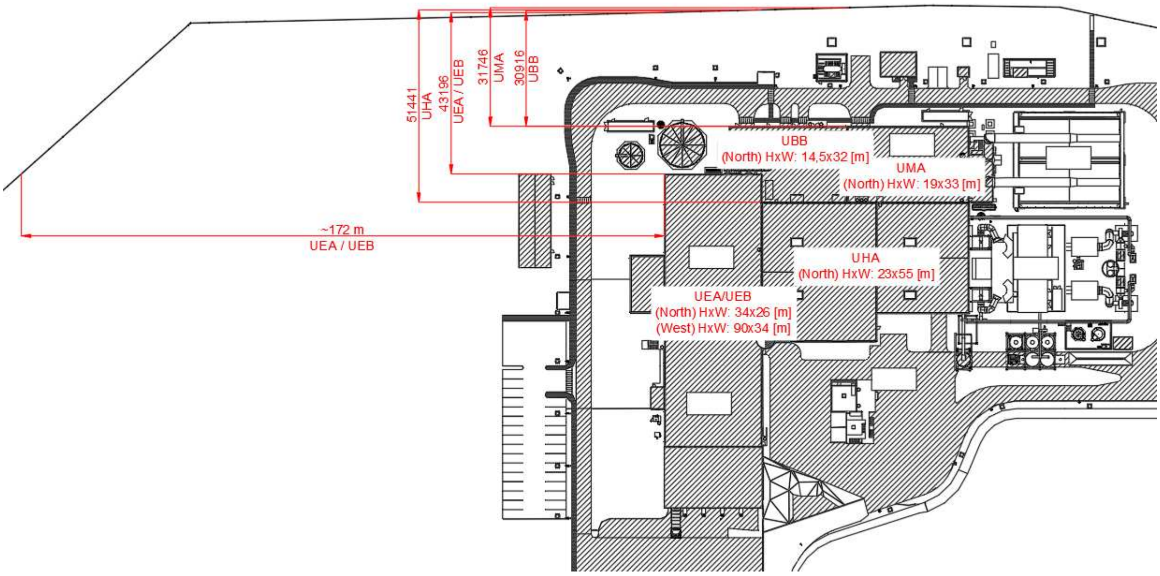
The nearest position of boundary to the building according to equation: $d = \sqrt{(uwh)}$

d=distance to boundary
u=portion of unprotected area of the enclosing rectangle
w=width of the enclosing rectangle
h=height of the enclosed rectangle
g=factor (table 4 of appendix A of BRE187)

The following buildings have been evaluated:

- The fuel unloading and storage building actual distance to the west boundary is 172 m. The calculated distance required to boundary according to BRE187 is 44 m - accepted
- The fuel unloading and storage building actual distance to the north boundary is 43 m. The calculated distance required to boundary according to BRE187 is 19 m – accepted
- The boiler building actual distance to the north boundary is 51 m. The calculated distance required to boundary according to BRE187 is 35 m - accepted
- The Electrical El Annex & Service Building actual distance to the north boundary is 31 m. The calculated distance required to boundary according to BRE187 is 8 m – accepted
- The Steam Turbine Building actual distance to the north boundary is 32 m. The calculated distance required to boundary according to BRE187 is 25 m – accepted

Note:
The areas indicated on the following figure are the exposing area towards the exposed boundary.



- Others buildings within the boundary is considered acceptable in regard to distances due to their heights and widths.

8.3 Separation and compartmentation - Insures Requirement

Fire areas should be separated from each other by 2 hour fire barriers, 15 m spatial separation or other approved means.

Fire areas to be defined as e.g.:

- Indoor biomass receiving / tipping floor and storage area
- Indoor processed and unprocessed biomass storage (e.g. storage other than in the Bunker or the biomass receiving / tipping floor)
- External processed and unprocessed biomass storage
- Processing area
- Each Shredder and associated dust collection equipment from every other shredder, and from other equipment
- Cable spreading rooms and cable tunnels
- Control Room, Computer Room, or combined Control / Computer Room
- CEMS room
- Rooms with major concentrations of electrical equipment, such as switchgear room and relay room
- Battery rooms
- Maintenance shop
- Fire pumps
- Warehouses
- Emergency diesel generator
- Office buildings
- Turbine-generator and engine-generator

Note 1:
Buildings spaced less than 15m will be fire rated for 2 hours for a fire from outside. One of two opposite buildings spaced less than 15m, shall be fire rated for two hours in regard to a fire from inside and outside or the two buildings shall be fire rated for 2 hours in regard to a fire from outside.

Note 2:

For buildings where the exposing building is of lesser height than the exposed building and where the roof of the exposing building has no fire resistance, the height of the protection above the roof should be 7.5m (ref. NFPA 80A; 4.3.8.2).

Note 3:
Where a façade serves two fire compartments it requires 2 hour fire rating for 7.5m to prevent 180 degree fire spread from one compartment to the other.

8.4 Other measures

8.4.1 Cavity barriers

Where appropriate, suitable provisions will be made to prevent the unseen spread of fire and smoke through cavities or concealed spaces by use of cavity barriers. Cavity barriers will be designed and located to achieve the performance required for Building Regulations compliance e.g. by following the guidance contained in BS9999.

It should be noted that cavity barriers are not required within walls of 'traditional construction' i.e. two leaves of masonry minimum 75mm thickness separated by an internal cavity. In this instance, where cavity closers are required they do not have to be provided with the same performance as a cavity barrier.

8.4.2 Fire doors

A Fire resistant door in compartment walls has the same fire resistance as the wall, e.g. the door in a 60 minuets compartment wall has to be rated FD60S.

8.4.3 Corridors

Corridors exceeding 12m in length that provide access to more than one exit will be subdivided by cross corridor fire doors. The doors should be positioned approximately mid-way along the corridor and should be rated FD 20S (BS9999 16.3.11.3; table 30). This does not mean that corridors are required to be broken down into 12 m segments.

8.4.4 Crane operator room viewing window

To achieve 2 hour fire resistance to the Control Room viewing window will have a glazing system designed to provide at least 60 minutes integrity. The fire resistant glazing will further be protected by a water drenching curtain system mounted on the Bunker side of the glazing (see section 16.3.3)

8.5 Ductwork

Fire protection of ventilation ductwork is needed as an integral part of the building's compartmentation strategy to ensure not to compromise the integrity of the means of escape. As such, the recommendations contained BS 9999 Section 32.5.2 will be adopted.

- Where air handling ducts pass through fire-separating elements such as compartment walls or the enclosures to protected escape routes, then the integrity of those elements should be maintained, using one or a combination of the following four methods:
  - Method 1: thermally actuated fire dampers;
  - Method 2: fire-resisting enclosures;
  - Method 3: protection using fire-resisting ductwork;
  - Method 4: automatically actuated fire and smoke dampers triggered by

Selection or combining the methods 1 to 4 will be evaluated based on the specific application in which they are to be used.

8.6 Fire stopping

All joints between fire separating elements will be adequately fire stopped and all openings for services passing through fire separating elements will be:

- As few in number as possible to serve the building;
- As small as possible to provide the service transit;
- Suitably fire stopped (allowing for thermal movement in the case of pipes and ducts).

8.7 Transformer cell

Requirement transformer cell
The transformer cell will be designed according to the recommendations in NFPA850; 5.1.4. The transformer is installed with a fixed fire suppression system (deluge sprinkler system) which will be release by means of heat detectors (glass bulbs). The transformer cell will be designed according to NFPA850; 5.1.4.3 to protect adjacent structures from exploding transformer bushings.
The transformer holds less than 18,925 litre but more than 1,890 litre oil which require separation of 7.6m (line of sight) for fragments by exploding transformer bushings.

Requirement firewalls
The cell for the oil filled transformer will be designed according to recommendations in NFPA850; 5.1.4.5:
Where a firewall is provided, it should be designed to withstand the effects of projectiles from exploding transformer bushings or lightning arresters.

8.8 Flue gas treatment

The filter bags installed in the filter is designed for high temperatures.

8.9 Fire separation (segregation) and compartmentation drawings

Fire separation of the various elements will be provided by a combination of one or more of the following measures:
Blockwork or concrete construction;
Fire rated cladding;
Spatial separation;
Active fire suppression;
Fire rated cladding

Ventilation ducts passing from one fire separated area to another will be provided with automatic fire dampers. Operation of dampers could either be from the fire detection system or inert gas panel. All dampers in the ventilation system are failsafe closed.

The fire segregation drawings for each main area are listed in section 19 and included in the attachment to this report ref. 2031.M0.J01.002 rev.0

The following colour code indicates the fire resistance indicated on the drawings.

(blue)	120 minutes

Note: The 120 minute fire resistance is achieved either by concrete, block wall or cladding (cladding walls 120 minute fire resistance from a fire outside towards inside).

9. Access and facilities for the Fire Service

9.1 Functional requirement

1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire-fighters in the protection of life.
2) Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.

9.2 Vehicle access

The typical design guidance for vehicle access routes is given below table (ref. ADB, table 20), although the route dimensions formally need to be confirmed with the Local Fire Authority. The accessed perimeter affords direct access to the stairs, which will provide a useful opportunity for internal firefighting

Table 20 Typical fire and rescue service vehicle access route specification

Appliance type	Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5
High reach	3.7	3.1	26.0	29.0	4.0	17.0

Notes:

1. Fire appliances are not standardised. Some fire services have appliances of greater weight or different size. In consultation with the Fire and Rescue Service, the Building Control Body may adopt other dimensions in such circumstances.
2. Because the weight of high reach appliances is distributed over a number of axles, it is considered that their infrequent use of a carriageway or route designed to 12.5 tonnes should not cause damage. It would therefore be reasonable to design the roadbase to 12.5 tonnes, although structures such as bridges should have the full 17 tonnes capacity.

9.3 Access to buildings for firefighting personnel

The process areas do not have internal storeys that are normally occupied that would require firefighting stairs. Specific risks in the process areas are provided with dedicated fire extinguishing/control systems as described in Section 16 to this report.

With the exception for the Control room (located at first floor of the El Annex & Service Building) the service and office areas that are normally occupied are all situated at ground floor level.

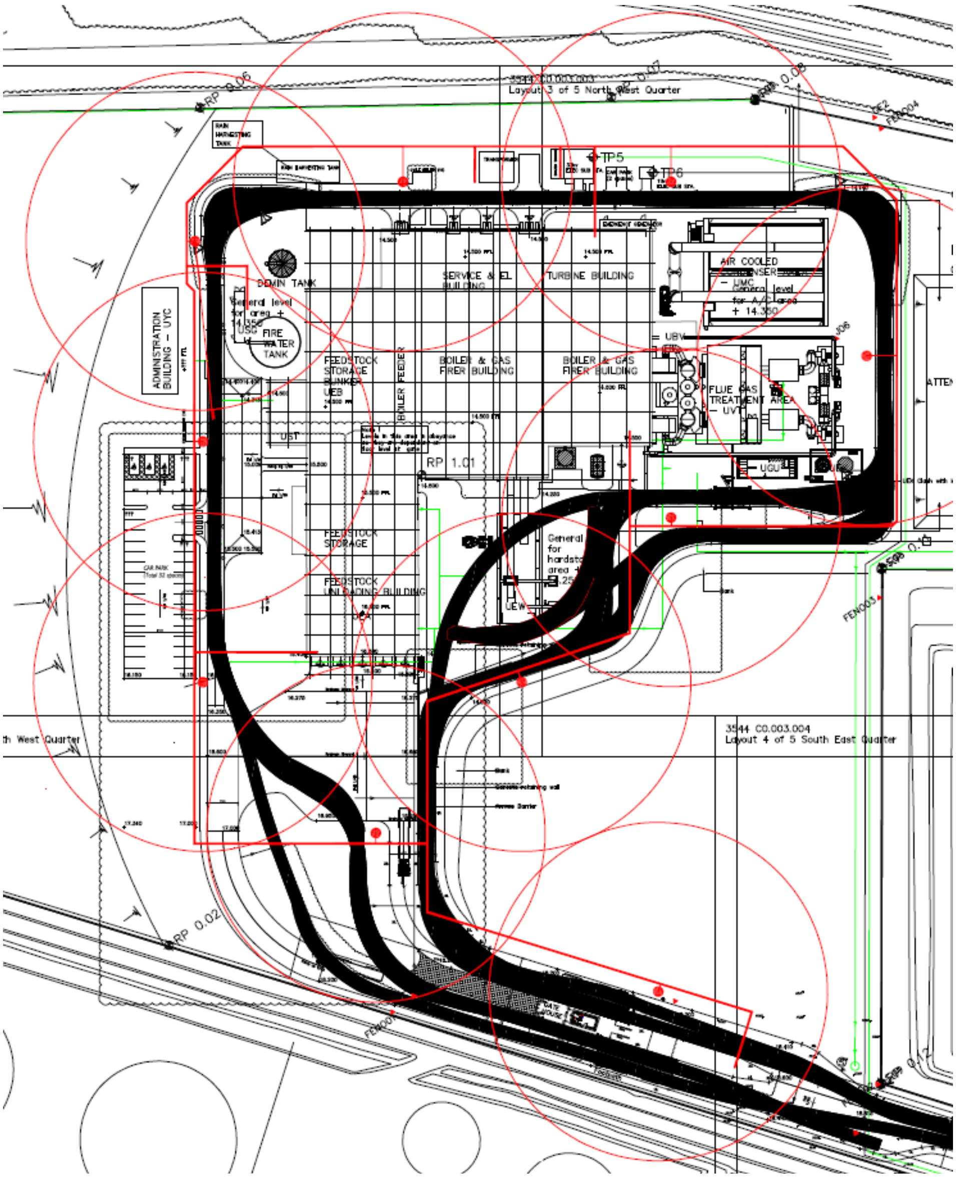
10. Fire main and location of hydrants

The proposed site exceeds 3 hectares in area therefore (in accordance with the guidance contained in Appendix 5 of the National Guidance Document on The Provision of Water for Fire Fighting 2007) a combined hydrant supply of 75 litres per second should ordinarily be provided. This however is based on the assumption that no additional firefighting measure have been provided. The provision of automatic fire suppression systems is based on NFPA850 requirements as detailed in Section 16 therefore the hydrant demand will be based around a hose reel demand of 1890 litres per minutes.

The Power Plant is to be provided with a looped fire hydrant ring main for use by the attending fire Service. Hydrants will be provided as indicated on the following diagram based on the provisions of NFPA850 (2015) Clause 6.4.1

The hydrants will be in accordance with BS 750:2012 to ensure compatibility with the equipment carried by the Local Fire and Rescue Service.

Hose cabinets located in the vicinity of each hydrant will be supplied with one spray nozzle (jet and fog) and a total of 30m hose.



11. Portable fire extinguishers

Portable fire extinguishers will be provided throughout the entire facility, selected according to perceived risk.

Electrical rooms and the boiler building will be equipped with CO2 extinguishers. STG room will be equipped with both dry powder and CO2 extinguishers.

The portable fire extinguisher layout drawings for each main area are listed in section 19 and included in the attachment to this report ref. ~~2031.M0.J01.002 rev. 0~~ Drawings pending design

12. Fire water run-off

Any area inside buildings (except the fuel storage) is drained to the sedimentation basin and treated as foul water.

The transformers are drained to the attenuation pond via the oil separators.

13. Smoke and heat venting system

Boiler building:
The boiler building is installed with four roof ventilation units which also serve as smoke extraction fans. The roof ventilation units are part of the normal ventilation system and for smoke extraction. In the event of a fire and required smoke or heat ventilation is needed the ventilation units can be opened from the DCS. Fresh air is provided either by the installed inlet dampers or by opening the gate at ground floor.
The roof ventilation units are designed as fail safe open. In the event of loss of power supply to the, units these will be forced open and the gate at ground floor will be opened and provide the required draft through the building for extraction.

Steam turbine building:
three fans are installed in the roof of the steam turbine building. The fans are rated as smoke extraction fans designed to operate at 300 °C for 3 hours. In the event of a fire and required smoke or heat ventilation is needed the fans can be started from the DCS. Fresh air is provided by the installed louvres in the wall of the building.
In the event of loss of power supply to the fans the remaining opening in the fans and the louvres will provide the required draft through the building for extraction.

Fuel Storage building:
The storage building is installed with natural ventilation and 4 pc. smoke extraction units. Each smoke extraction unit is sized to 25,000 m3/h and rated for operation for 2 hours at 300 °C (F300)

Control room:
Fresh air is continuously supplied into the MV room (pressurized). The outlet from the MV room is ducted to the battery room for continuously air exchange. In the event of fire all dampers leading to and from the rooms will be closed.

14. Dangerous Substances and Explosive Atmospheres Regulations

14.1 DSEAR report

All areas that are considered as potentially hazardous with regard to explosion risk have been assessed and included in document 2031.S0.X02.001 – Dangerous Substances and Explosive Atmosphere (DSEAR) Pending completion

Equipment and machinery for areas classified as hazardous will be suitable for installation and operation in those areas and supported by relevant markings and certification.

15. References

The following regulations and reference documents have been used in the preparation of this report:

- Guidance Document, Waste Processing Plant – Fire Systems, Issue 2.0, dated 19 May 2017(*1: see section 3.1)
- Guidance Document, Energy from Waste – Fire Systems, Issue 3.0, dated 19 May 2017(*1: see section 3.1)
- S.I. 2010 No. 2214 - The Building Regulations 2010
- S.I. 2005 No. 1541 - The Regulatory Reform (Fire Safety) Order 2005
- The Building Regulations 2010, Approved Document B Volume 2 - Fire Safety; (2006 edition incorporating 2007, 2010 and 2013 amendments)
- National Guidance Document on The Provision of Water for Fire Fighting (January 2007, 3rd edition)
- BS 9999: 2017; Code of Practice for Fire Safety in the Design, Management and Use of Buildings
- BS5839-1:2002; Fire detection and alarm systems for buildings Part 1 – Code of practice for system design, installation, commissioning and maintenance
- BS8300: 2009; Design of buildings and their approaches to meet the needs of disabled people. Code of Practice
- NFPA850: 2015; Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- NFPA13: 2016; Standard for the Installation of Sprinkler Systems
- NFPA14: 2016; Standard for the Installation of Standpipe and Hose Systems
- NFPA15: 2012; Standard for Water Spray Fixed systems for Fire Protection
- NFPA16: 2011; Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
- NFPA20: 2010; Standard for the Installation of Stationary Pumps for Fire Fighting
- NFPA101: 2018; Life Safety Code
- Research Establishment Report BRE187 (1991 – External fire spread: Building separation and boundary distances)
- CIBSE Guide E; Fire engineering
- WASTE 28 Reducing fire risk at waste management sites issue 2 – April 2017

16. Fire safety provisions (Statutory requirement and Insurer's requirement)

The following describes each of the additionally fire safety measures to be incorporated in the design of the power plant for life safety and property protection (the figures mentioned for the water based fire suppression systems would not necessarily be accurate however, they does provide sufficient information for the design and sizing of the fire water requirement i.e. fire water storage tank and fire pump capacity).

Fire suppression systems will be designed in accordance with the recommendations of NFPA with the exception of the inert gas systems which will be designed in accordance with BS EN15004.

Note: Any water filled pipe, valve, deluge valve etc. serving fire suppression systems and dry risers with risk of being exposed to low temperature (frost) shall be properly heat traced.

16.1 Compartmentation – Fire segregation

Refer to section 8.9

16.2 Hydraulic systems

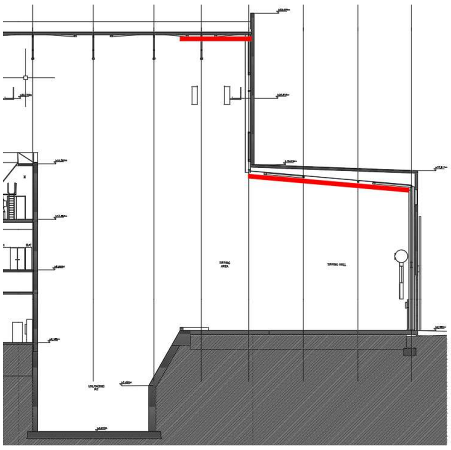
Listed Fire resistant hydraulic fluids will be used for hydraulic systems.

16.3 Fixed fire protection – Sprinkler and Monitor

In order to minimise losses to plant, production and personnel, certain areas and risks in a Power Plant of this type are recommended to be provided with fixed fire protection systems (manual or automatic in operation as appropriate).

16.4 Waste Fuel Unloading Area - UEA

16.4.1 Tipping hall

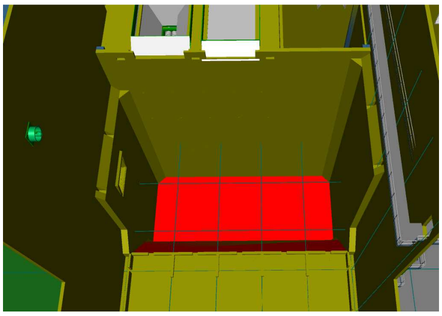


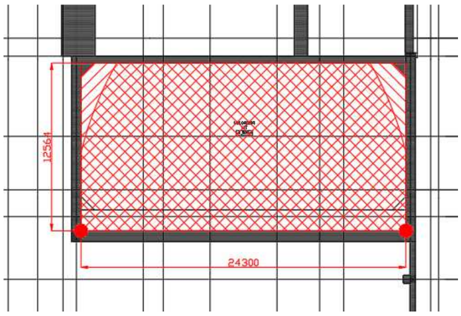
The tipping Hall will be provided with automatic sprinkler protection throughout. The systems will be designed for a minimum of 10.2 mm/min over the most remote 279 m2 of floor area with the protection area per sprinkler not to exceed 12.0 m2. High temperature sprinklers 121°C to 149°C should be used.

The system will be designed as a dry pipe system why the water consumption calculated below is increased by 30%

Water consumption ~222 m3/h

16.4.2 Bunker





The fuel bunker will be installed with two monitors each with a capacity of minimum 946 l/min at 6.89 bar. The monitors will be located to allow for coverage of all pit areas with both streams operating simultaneously.

Upon detection of fire and automatic start of the monitors, the monitor nozzles will automatic start oscillating. Manual override will be provided and the monitors will be capable of remote operation from the crane operator room and the central control room.

Water consumption ~114 m3/h

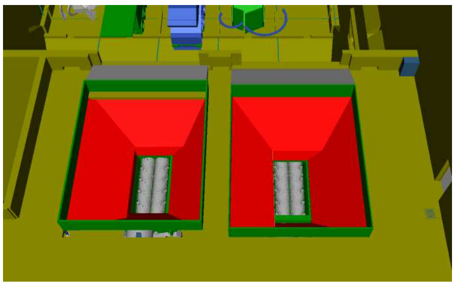
16.4.3 Crane operator room viewing window

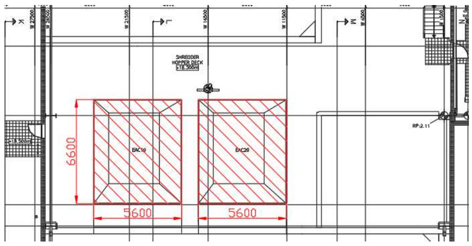
Additional to the fire rated glazing for 60 minutes for the viewing window towards the bunker, a water drenching curtain system will be mounted on the bunker side of the glazing designed for a density of 10.2 mm/min over the window area. The water drenching system will be automatically activated via the bunker fire detection system linked to a deluge valve. In addition, a manual initiation system will be installed inside the crane operator room and the central control Room.

Water consumption ~5.8 m3/h

16.5 Shredder Area – UEA/UEB

16.5.1 Shredder hopper 1 and 2

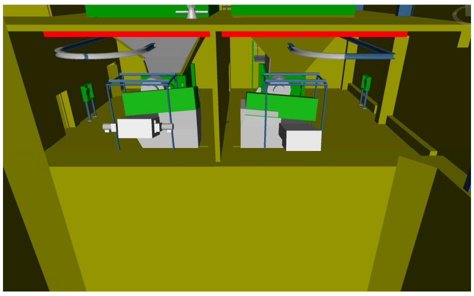


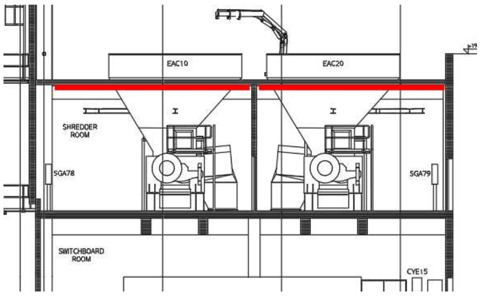


Each of the feed hoppers for the shredders will have automatic deluge protection designed for a minimum of 8.1 mm/min over the entire Hopper, with the protection area per deluge head not to exceed 12.0 m2. Manual activation of the Hopper deluge system will be possible from the Control Room

Water consumption ~18 m3/h (each)

16.5.2 Shredder enclosures





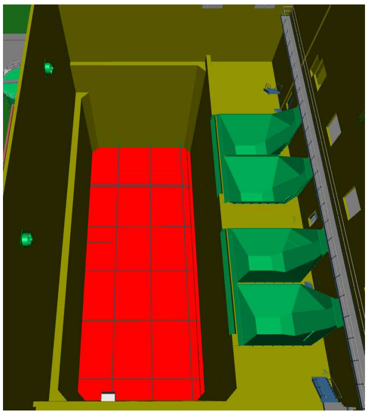
Each shredder enclosure (area 7.850mm x 11.700mm) will be provided with automatic sprinkler. The systems will be designed for a minimum of 10.2 mm/min over the most remote 279 m2 of floor area with the protection area per sprinkler not to exceed 9.3 m2.

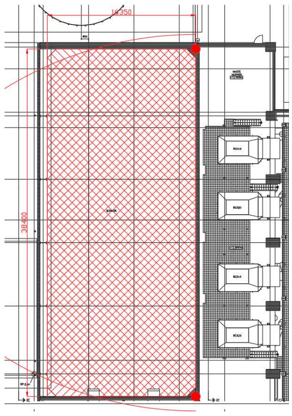
The system will be designed as a dry pipe system why the water consumption calculated below is increase by 30%

Water consumption ~ 73 m3/h (each)

16.6 Waste Fuel Storage Area - UEB

16.6.1 Bunker



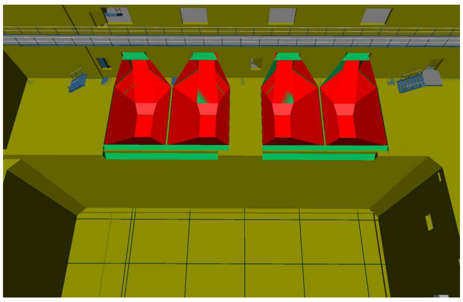


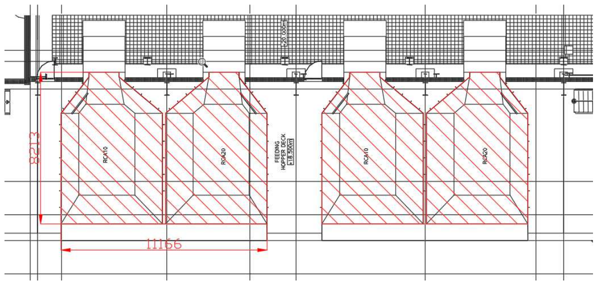
The fuel bunker will be installed with two monitors each with a capacity of minimum 946 l/min at 6.89 bar. The monitors will be located to allow for coverage of all pit areas with both streams operating simultaneously

Upon detection of fire and automatic start of the monitors, the monitor nozzles will automatic start oscillating. Manual override will be provided and the monitors will be capable of remote operation from the central Control Room.

Water consumption ~114 m3/h

16.6.2 Boiler hopper line 1 and line 2

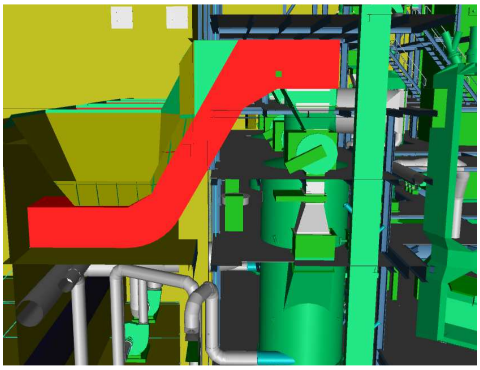




Each of the feed hoppers for the boiler will have automatic deluge protection designed for a minimum of 8.1 mm/min over the entire Hopper, with the protection area per deluge head not to exceed 12.0 m2. Manual activation of the Hopper deluge system will be possible from the Control Room

Water consumption ~45 m3/h (each)

16.6.3 Feeding conveyor to boiler



Each of the conveyors for feeding the boiler will be installed with a sprinkler system. The sprinkler system covers the complete length of the conveyor.
Sprinkled conveyor area approximately: 2.3 m x 18 m ~41.5 m2
The systems will be designed for automatic release and a minimum of 10.2 mm/min.

Water consumption ~25 m3/h (each)

16.7 Step-up transformer

The sprinkler system covers the complete transformer cell.
Enveloped transformer area: 148 m2. Surrounding area: 53 m2
Sprinkler water demand enveloped area 10.2 mm/min and surrounding area 6.1 mm/min as according to NFPA 15 section 7.4.4.
The sprinkler system will be designed as a deluge system for automatic release. Automatic release will be by means of a pressurized (service air) trigger line connected to the deluge valve. Activating the trigger line is by means of sprinkler heads with release temperature at 30 °C above ambient temperature.
Deluge valve to be pneumatically released

Fire water consumption ~110 m3/h Exact size of the transformer has not been confirmed.

16.8 Emergency diesel generator

The emergency diesel generator is installed outdoor in a weather proof and non-combustible enclosure (Canopy) and is a standard package unit. The unit will be equipped with smoke detectors for early warning and an internal sprinkler system. The sprinkler system will be release by means of heat detectors (glass bulbs, set point 30 °C above ambient temperature.

16.9 Containerized fire pump unit

The containerised fire pump unit will be designed according to NFPA20. This includes fire protection of the interior of the containerized unit with automatic sprinklers to all areas including the fuel tank.

16.10 Steam turbine generator

16.10.1 Turbine bearings, generator bearings, gearbox and main steam valve

Turbine bearings, generator bearings and gearbox will be protected by an automatic low pressure pre-action closed head sprinkler system.

The fire protection system for the gearbox and main turbine hydraulic valve will be designed for a density 12.2 mm/min accordance to NFPA850 (2015); 7.7.4.1 through 7.7.4.3.

The fire protection system for the turbine generator bearings will be designed for a density 10.2 mm/min accordance to NFPA850 (2015); 7.7.4.2

16.10.2 The area beneath the turbine table, the purifier- and the Lube Oil units.

The area beneath the turbine table, the purifier- and the Lube Oil units will be protected by a foam based fire protection system

The fire protection system will be designed for a density of minimum 6.5 mm/min in accordance to NFPA16 (2015); 7.3.2.1 and a duration of minimum 10 minutes in accordance to NFPA16 (2015); 7.3.3.1

The foam system will be for automatic will be by means of (combination of) smoke and flame detectors through a deluge valve as well as manual release. Manual release points will be located inside the room in the vicinity of the risk.

16.10.3 Spray guides

To reduce the risk of aerosols from oil originated from a leaking flange assembly in the turbine building, flange assemblies will be installed with spray guides.

16.11 Boiler auxiliary burners

The auxiliary burners for the boiler will be provided with a foam based automatic fire protection system. The fire protection system will be designed for a density of minimum 6.5 mm/min in accordance to NFPA16 (2015); 7.3.2.1 and a duration of minimum 10 minutes in accordance to NFPA16 (2015); 7.3.3.1

The foam system will be designed to cover an area in a distance of 6.1 m from the auxiliary burner.

The foam system will be for automatic release by means of (combination of) smoke and flame detectors through a deluge valve as well as manual release. Manual release points will be located inside the room in the vicinity of the risk.

16.12 Electrical rooms

A total flooding inert gas system will be provided for the following rooms:

MV room*
LV room*
DCS equipment room *
Battery room*
SAT room (building)*
Feedstock handling SWBD. room

ACC / Steam Turbine SWBD. room
FGT Area SWBD. room
CEMS

*The area is served from one central bank.

The gaseous extinguishing systems will be designed according to EN15004-2009 and based on discharge of Inergen (IG541).

Coverage will include floor voids and ceiling voids where applicable.

Automatic systems must be interlocked such that when the room is occupied, extinguishant discharge cannot occur. The system may operate in fully automatic mode when such rooms are unoccupied.

16.13 FGT Bag filter

A N2 extinguishing system will be installed for protection of the Bag filter. The system will be designed to flood one compartment out of six. The system will be released based on temperature switches monitoring each compartment.

16.14 Smoke and Heat Venting system

Refer to section 13

16.15 Hose reels

Hose reels are provided for manual fire-fighting in the following areas:

- Boiler building
- Steam turbine building
- Fuel unloading area

The hose reels inside the process buildings will be designed so that all areas are within the range of a fire hose.

Size of hoses will be 1” (DN25) semi ridged rubber hoses.

16.16 Dry riser

Dry risers with landing valves located at each level will be installed at the two internal staircases inside the boiler building (UHA) and at the external staircase located east of the boiler building (UHA) and west of the fuel storage building (UEA/UEB) for the use of the attending Fire Service.

16.17 Fire department connection

Two 2-way inlet breeching valves will be available on site allowing for charging the fire main. One will be available at the gate to enter the power plant and one will be available next to the steam turbine building (UMA). The connections will be 2 1/2” and according to BS336.

16.18 Fire water tank – Spare nozzle for fire water supply to fire department and filling of tank

The fire water storage tank will be equipped with a spare connection to allow the fire department to connect directly to the tank for dragging water to the fire engines. Type of coupling to be agreed.
The fire water storage tank will normally be filled and refilled through a fixed connection to the site water supply from the public water supplier. To allow for additional filling the fire water storage tank will equipped with a separate connection installed with a 2-way inlet breeching valve. The connection will be 2 1/2” and according to BS336.

16.19 Water supplies for firefighting purposes

The firefighting water supply is to comprise a water storage facility for the fire main (and standby fire pumps (100% duty) and a jockey pump to maintain quiescent ring main pressure). The supply design for the Power Plant is based on the requirements of NFPA850:

The water supply for the permanent fire protection installation should be based on providing a 2-hour supply for:

- o Either the largest fixed fire suppression system demand or any fixed fire suppression system demands that could reasonably be expected to operate simultaneously during a single event.

And

- o The hose stream demand of not less than 500 gpm (1893 L/min) (113.6 m3/h)

In this context this is likely to be:

- The required water consumption for the sprinkler system for the tipping hall 222 m3/h
- The hose stream demand of 113.4 m3/h

Required water supply for firefighting purpose: 2 hours x (222 + 113.6) ~671 m3
As per the above calculations the required pump capacity will be based on the water requirement for the tipping hall sprinkler system and the hose stream demand.

Total static water supply volume for fire-fighting will be minimum 671 m3 and fire pump duty rating to be 335.5 m3/h at 10.3 bar(g).

The fire water storage tank (SGA11 BB001) combines provision for both sprinkler and hydrants.

> Requirement according to Approved Document B Vol. 2; B5; 15.8
> *Where no piped water supply is available, or there is insufficient pressure and flow in the water main, or an alternative arrangement is proposed or an alternative source of supply is proposed, the alternative source of supply should be provided in accordance with the following recommendations e.g. a charged static water tank of at least 45,000 litre capacity.*

Note:
It is considered reasonable and adequate that the combined firewater storage tank includes water for the hydrant installation, as the calculated firewater storage for hydrants is 226.8 m3 (exceeding 45 m3 as per APD B).

17. Impairment procedure

NFPA25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, provides guidelines in regard to how to act in case of impairment. Based on these guidelines the O&M Contractor should prepare and issue procedures, so that these are in place before actually needed. Further, the O&M Contractor and his team should be familiar with these procedures and responsible members should be appointed before an actual event would occur. The following from NFPA 25 – Definition:

Impairment. A condition where a fire protection system or unit or portion thereof is out of order, and the condition can result in the fire protection system or unit not functioning in a fire event.
Emergency Impairment. A condition where a water-based fire protection system or portion thereof is out of order due to an unplanned occurrence or the impairment is found while performing inspection testing or maintenance activities.
Preplanned Impairment. A condition where a water-based fire protection system or a portion thereof is out of service due to work planned in advance, such as revisions to the water supply or sprinkler system piping.

As mentioned in NFPA25 section 15.4.2 impaired equipment shall include, but shall not be limited to:

(1) Sprinkler systems
(2) Standpipe systems
(3) Fire hose systems
(4) Underground fire service mains
(5) Fire pumps
(6) Water storage tanks
(7) Water spray fixed systems
(8) Foam-water systems
(9) Water mist systems
(10) Fire service control valves

NFPA 25, section 15.6 Emergency Impairments
15.6.1 Emergency impairments shall include, but are not limited to, interruption of water supply, frozen or ruptured piping, and equipment failure, and includes impairments found during inspection, testing, or maintenance activities
15.6.2 The coordinator shall implement the steps outlined in section 15.5

NFPA 25 section 15.5 Preplanned impairment program
15.5.1 All preplanned impairments shall be authorized by the impairment coordinator.
15.5.2 Before authorization is given, the impairment coordinator shall be responsible for verifying that the following procedures have been implemented:

(1) The extend and expected duration of the impairment have been determined.
(2) The areas or buildings involved have been inspected and the increased risks determined.
(3) Recommendations to mitigate any increased risks have been submitted to management or the property owner or his designated representative.
(4) Where a fire protection system is out of service for more than 10 hours in a 24-hour period, the impairment coordinator (see NFPA25 (2014) section 15.2) shall arrange for one of the following:
    (a) Evacuation of the building or portion of the building affected by the system out of service
    (b) An approved fire watch
    (c) Establishment of a temporary water supply
    (d) Establishment and implementation of an approved program to eliminate potential ignition sources and limit the amount of fuel available to the fire.
(5) The fire department has been notified
(6) The insurance carrier, the alarm company, property owner or designated representative, and other

authorities having jurisdiction have been notified.

(7) The supervisors in the areas to be affected have been notified.
(8) A tag impairment system has been implemented.
(9) All necessary tools and materials have been assembled on the impairment site.

NFPA 25 section 15.7 Restoring systems to service
When all impaired equipment is restored to normal working order, the impairment coordinator shall verify that the following procedures have been implemented:

(1) Any necessary inspections and tests have been conducted to verify that affected systems are operational. The appropriate chapter of NFPA 25 shall be consulted for guidance on the type inspection and test required.
(2) Supervisors have been advised that protection is restored.
(3) The fire department has been advised that protection is restored.
(4) The property owner or designated representative, insurance carrier, alarm company, and other authorities having jurisdiction have been advised that protection is restored.
(5) The impairment tag has been removed

Definitions:
NFPA25 (2014) Definitions 3.3.21: Impairment. A condition where a fire protection system or unit or portion thereof is out of order, and the condition can result in a fire protection system or unit not functioning in a fire event.

3.3.21.1 Emergency Impairment. A condition where a water based fire protection system or portion thereof is out of order due to an unplanned occurrence, or the impairment is found while performing inspection testing or maintenance activities.

NFPA 25, 15.2 Impairment Coordinator.
15.2.1 The property owner or designated representative shall assign an impairment coordinator to comply with the requirements of this chapter.
15.2.2 In the absence of a specific designee, the property owner or designated representative shall be considered the impairment coordinator.

Note: This section 14 should not be considered fulfilling all requirements within NFPA25. NFPA 25 should be reviewed in its full length and be implemented in the impairment procedures where applicable.

18. Follow on design

The purpose of this report is to support Building Regulations application and Local Fire and Rescue Service discussions.

The actual design and specification of the systems and fire safety provisions described herein are required to be carried out during the detailed design stage of the project and are likely to form part of the M&E package, otherwise specialist fire alarm and protection design input should be sought.

Any fire safety designs will be required to be submitted to Building Control for areas that are subject to the Building Regulations; i.e. permanently occupied buildings and facilities such as administration and offices etc. Where not covered by the Building Regulations, the designer is required to ensure that a suitable level of fire safety has been provided to safeguard any persons who may occasion the affected areas – this may be demonstrated by following established published guidance or performance based design and should be the subject of discussion with the Local Fire and Rescue Service.

Where fire safety provisions have been made purely for the protection of property or business continuity the design should be in accordance with both the Client's requirements and those of the eventual insurer.

Prior to full operation of the plant and occupation of the administration and office areas a documented fire risk assessment is required under the Regulatory Reform (Fire Safety) Order 2005. The fire risk assessment should be carried out by a person or persons conversant with the fire safety provisions and operating procedures for the installation. The Local Fire and Rescue Service will not provide a fire risk assessment but will require its availability for inspection at any reasonable time during the occupation and operation of the installation.

19. Attachments

(separate document – 2031.M0.J01.002)

Drawing Number	Drawing Title
2031.M4.J01.001 R0	Fire Main layout
2031.M4.J05.101 to 111.R0	Escape and egress Boiler building (UHA)
2031.M4.J05.211 to 215.R0	Escape and egress Waste fuel storage area (UEB)
2031.M4.J05.661.R0	Escape and egress Workshop building (UST)
2031.M4.J05.251 to 256.R0	Escape and egress Fuel unloading area (UEA) and fuel storage area (UEB)
2031.M4.J05.301 to 304.R0	Escape and egress Air cooled condenser (UMC) and ACC Ext. El annex (UBV)
2031.M4.J05.401.R0	Escape and egress Flue gas treatment area (UEH, UEK, UVT)
2031.M4.J05.501 to 502.R0	Escape and egress Steam turbine building (UMA)
2031.M4.J05.505.R0	Escape and egress Steam turbine building (UMA)
2031.M4.J05.611 to 613.R0	Escape and egress Slag area (UEW)
2031.M4.J05.711 to 714.R0	Escape and egress Service building / El annex (UBB)
2031.M4.J05.751.R0	Escape and egress Step-up transformer area (UBT)
2031.M4.J05.761.R0	Escape and egress 33 kV Sub-station (UAA)
2031.M4.J05.771.R0	Escape and egress 11 kV Sub-station (UAB)
2031.M4.J05.801.R0	Escape and egress Administration building (UYC)
2031.M4.J05.850.R0	Escape and egress Site entrance (UZA-1), Security gate house (UYF) and Weighbridge area (UYE/UYX)
2031.M4.J07.XXX R0	Portable extinguisher location Drawings pending design Boiler building (UHA) and slag storage (UEW), level +0.000
2031.M4.J09.XXX R0	Hose reel layout UHA – Level 0.000 Drawings pending design
2031.M4.J12.101 to 110.R1	Fire segregation
2031.E4.F01.001 R0	Equipment layout of Fire Detection System Drawings pending design
2031.E4.F02.001 R0	Aspiration equipment layout Drawings pending design
2031.E4.S11.XXX R0	Light & Small Power UBB, UBD & UBT Drawings pending design
2031.C0.110.001 R0	Swept Path Analysis Drawings pending design
ASET calculation part 1a to 1d.	

20. Appendix I – ASET calculations

Detailed calculations are part of the attachment in section 19.

MEMO

Job	**Hooton Bio Power Project**
Client	**BWSC**
Memo no.	**Appendix I**
Date	**2018-12-12**
Version	**1.0**
From	**Michael Gould Bøeg Christiansen**
Reviewed by	**Carsten Hald (BWSC)**

Date

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1. Introduction

This memo is Appendix I to the Fire Safety Strategy Report for the Hooton Bio Power Project.

The purpose of this memo is to describe the effect of a fire in the boiler building (UHA), in regards to the smoke filling in the Boiler room, were the temperature of the smoke layer and critical condition is assessed.

The effects are found using the software "Argos" with is a 2-zone model.

2. Argos software

For this memo The Argos software[1] version 5.9.96.421 developed by "DBI" is used. Argos software is at 2-zone model in which a fire in an enclosed room can be model.

When using a 2-zone model the enclosed room is divided into two distinct compartment gas zones: an upper (hot) volume and a lower (cool) volume resulting from thermal stratification. See Conservation equations are applied to each zone and serves to embrace the various transport and combustion processes that apply. The fire is represented as a source of energy and mass, and manifests itself as a plume which acts as a "pump" of mass from the lower level zone to the upper zone.

[1] http://en.dbi-net.dk/argos/

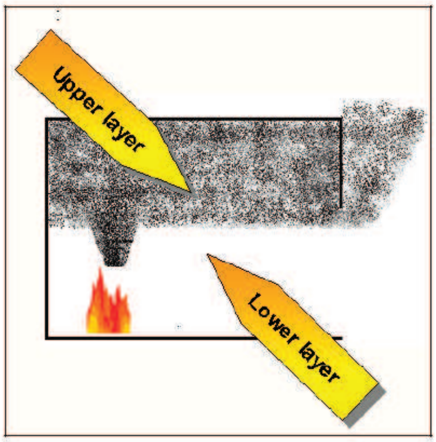


Figure 1, a 2-zone model. Figure from the Argos User Guide.

3. Fire used in model

In the Boiler building there will not be stored combustible materials, but there is a risk of an oil leak from the Boiler auxiliary oil burner placed in the centre of the building. The auxiliary burner for the boiler will be provided with a foam based automatic fire suppression system in accordance with NFPA 850. Since there is a fire suppression system, the fire from the oil spill will be controlled and not become a large fire, corresponding to a pool of oil with a diameter of 3 m. There is also an emergency cut-off valve that will prevent further oil been spilled on the floor of the Boiler Building.

The risk profile of the boiler building is A3, so the fire growth rate is “fast”. In the Argos model an Energy formula fire is used, so to fire the Convective energy release rate of a pool fire from an oil spill with a diameter of 3 m, is calculated below.

Fireload in compartment, Pool Fire			
Material data from Table 3.3 "Enclosure Fire Dynamics":			
Transformer oil; hydrocarbon	Density =	760	kg/m^3
	$m''_{inf\infty}$=	0,039	$kg/(m^2s)$
	ΔH_c =	46,4	MJ/kg
	$k\beta$ =	0,7	m^{-1}
Calculations:			
Diameter of fuel source, Pool fire	D=	3	m
Spill area	$A = \pi/4 \cdot D^2 =$	7,1	m^2
Free bure mass loss rate	$m''_{inf} = m''_{inf\infty} \cdot (1-\exp(-k\beta D)) =$	0,034	$kg/(m^2s)$
Total energy release rate			
(assuming the combustion effecincy to be 70%)	$Q = A \cdot m''_{inf} \cdot 0{,}7 \cdot \Delta H_c =$	7857	kW
Convective energy release rate factor	F_{Qc} =	0,7	
Convective energy release rate	$Q_c = Q \cdot F_{Qc} =$	5500	kW

To see the effect of the size of the fire, a fire with the double convective energy release rate is also used.

4. Boiler Building (UHA)

The boiler building is a building with to heights.
The tall part (Part I) has a with a length of 30,5 m a width of 36 m and a height of 36 m. The area of Part I is app. 1.098 m^2 and has a perimeter is 152 m.
The lower part (Part II) has a with a length of 25 m a width of 29 m and a height of 24 m. The area of Part II is app. 725 m^2 and has a perimeter is 108 m. Se Figure 2.

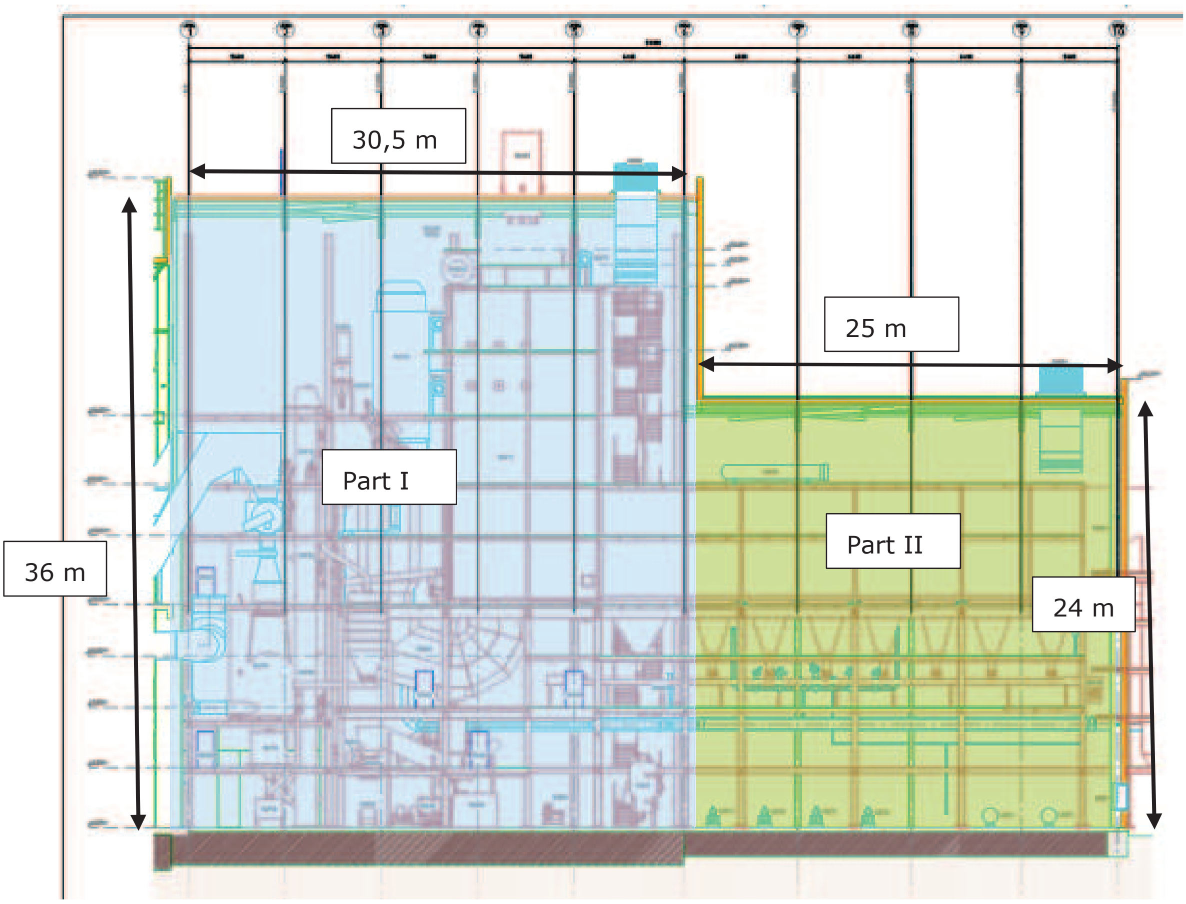


Figure 2, Building geometry

The building is a steel building with a steel-plate wall and roof. Note that Argos those not have this "Basic building construction", and a concrete building has been used.

To take the smoke spread between the two building parts into account in Argos, the Boiler Building is regarded as a two large rooms in regards to smoke filling, with an opening (29 m x 24 m) between the two rooms, corresponding to open the areal between the two "rooms".

The Boiler room as openings in the roof, but these openings are consisted as closed and no smoke loss through these opening are not taken into account in the calculations, with is a conservative way of modelling the building.
In the Argos model only one door opening of 2 m is used to the surroundings, since the Argos program needs an at least 1 opening to run the calculations, but there is no smoke loss through this opening.

In the Argos calculations the fire is stared in both rooms, to insure the smoke spread between the two “rooms” are taken into account.

5. Critical conditions

The looking at critical conditions in the Boiler building there flowing criteria are used.

- **Visibility**. If the visibility is less than 10 m, conditions are considered to be critical.
- **Distance from floor to smoke layer**. If the distance reaches less than 1.6 m + 10 % of the height of the room, conditions are considered to be critical.
- **Temperature in smoke free zone (lower zone)**. If the temperature in the smoke free zone reaches 60-80 °C, conditions are considered to be critical.
- **Heat radiation from smoke layers**. If the radiation surpasses is more than 2.5 kW/m^2, conditions are considered to be critical.
- **Oxygen level**. When the oxygen level is less than 15 % in the lower level, conditions are considered to be critical.
- **Carbon Dioxide (CO_2) level**. When the CO_2 level in the air is higher than 5 %, conditions are considered to be critical.
- **Carbon Monoxide (CO) level**. When the CO level in the air is higher than 200 ppm, conditions are considered to be critical.

6. Results Argos

A summary of the results from the 2-zone Argos model can be seen in Table 1 and Table 2. A complete report of the results can be seen in the Argos calculation report in Appendix Ia to Id, with are appendix to this report.

Table 1, results from the 2-zone model part I

Fire size	Time to critical conditions	Critical conditions due to	Temperature in upper smoke layer at 30 min.	Temperature in upper smoke layer at 60 min.
5,5 MW, fire started in part I	10 min. 11 sec.	Smoke free height less than 5,2 m.	76 °C	118 °C
11 MW, fire started in part I	8 min. 57 sec.	Smoke free height less than 5,2 m.	128 °C	219 °C
5,5 MW, fire started in part II	8 min. 14 sec.	Smoke free height less than 5,2 m.	72 °C	116 °C
11 MW, fire started in part II	7 min. 40 sec.	Smoke free height less than 5,2 m.	121 °C	213 °C

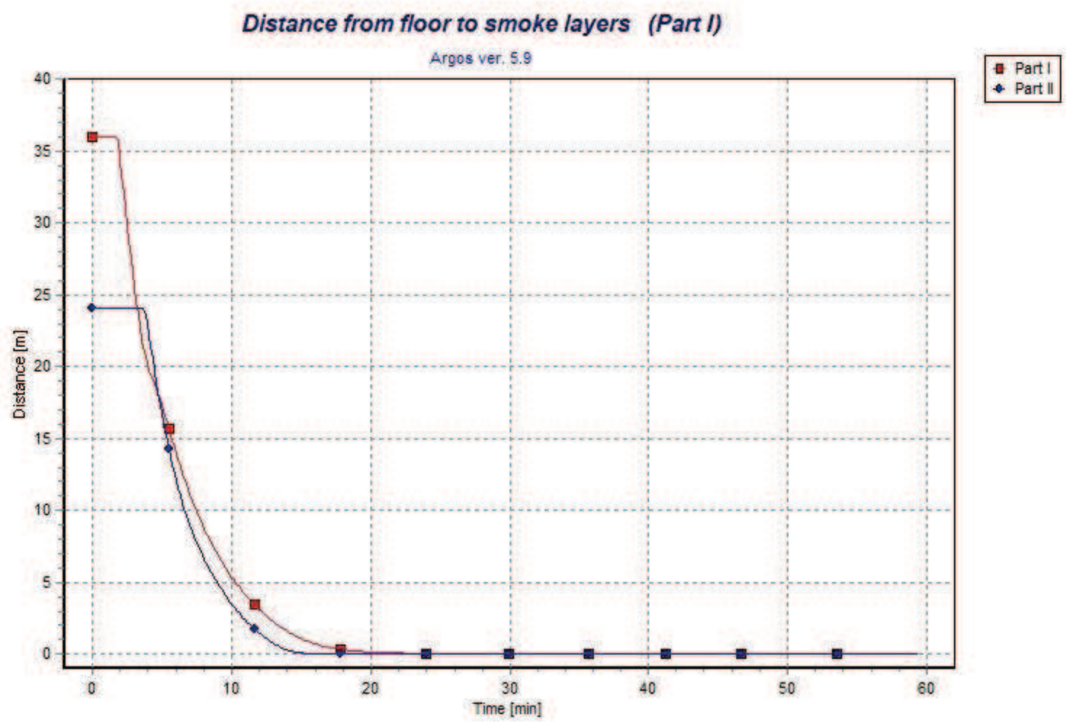
Table 2, results from the 2-zone model part II

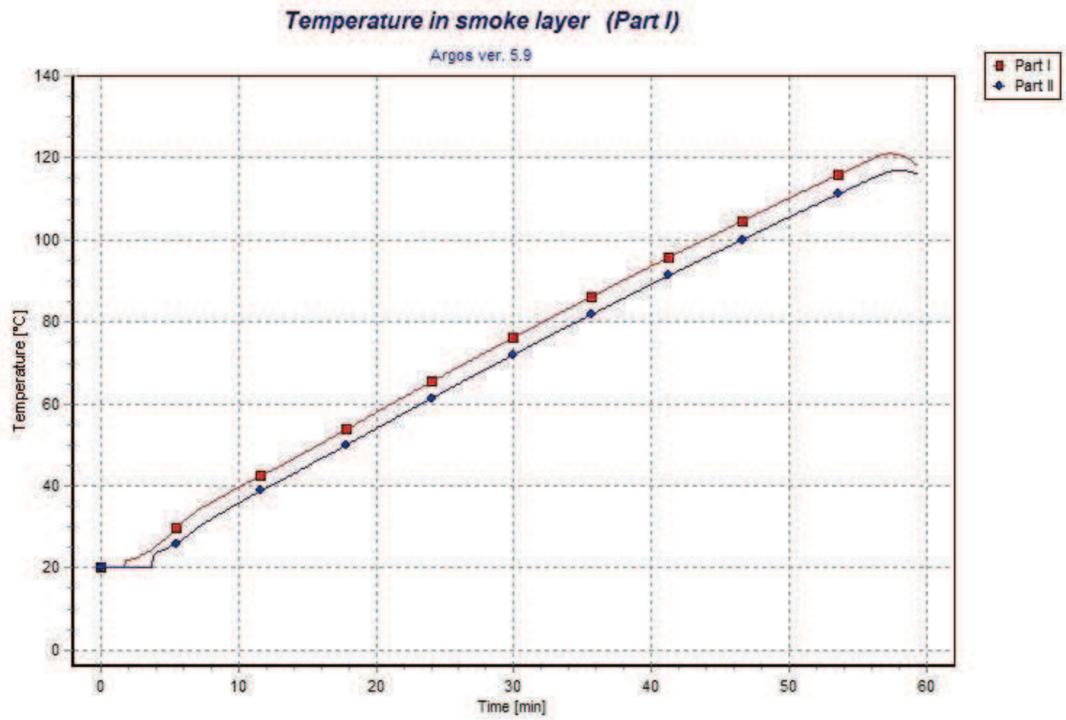
Fire size	Time to critical conditions	Critical conditions due to	Temperature in upper smoke layer at 30 min.	Temperature in upper smoke layer at 60 min.
5,5 MW, fire started in part I	9 min. 40 sec.	Smoke free height less than 4,0 m.	73 °C	117 °C
11 MW, fire started in part I	8 min. 27 sec.	Smoke free height less than 4,0 m.	121 °C	212 °C
5,5 MW, fire started in part II	10 min. 31 sec.	Smoke free height less than 4,0 m.	79 °C	118 °C
11 MW, fire started in part II	9 min. 11 sec.	Smoke free height less than 4,0 m.	134 °C	221 °C

It can be seen that the size of the fire has little effect on the time to critical conditions, so a ASET time a 7 minutes and 40 seconds can be used for the Boiler Building.

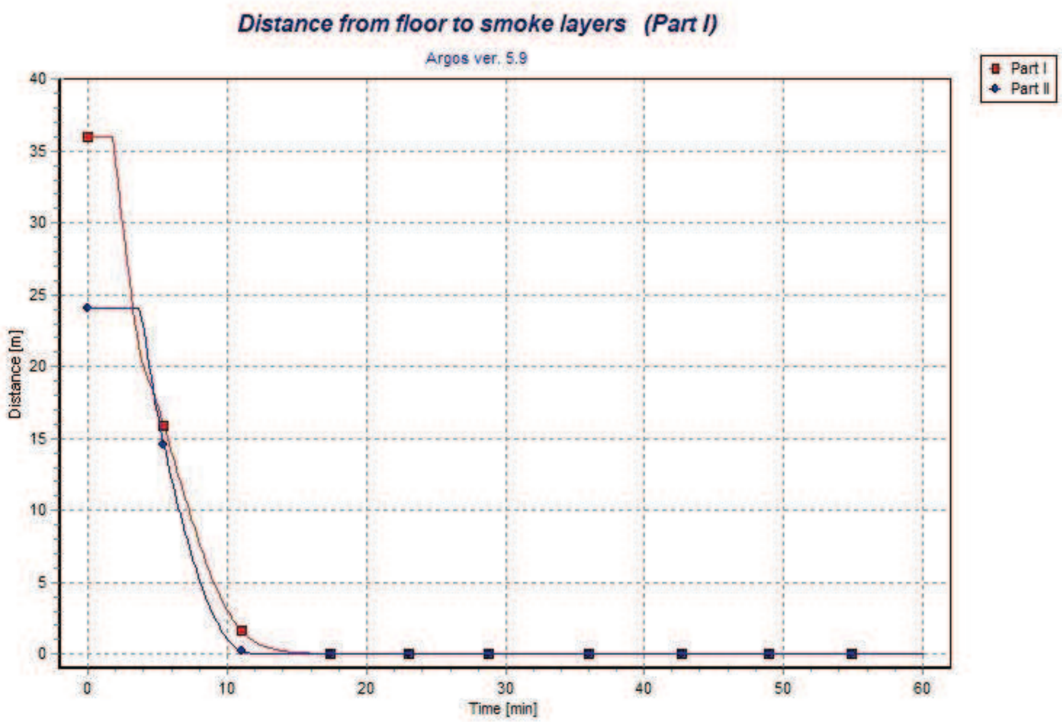
In the following sections the smoke level from the floor and temperature in the smoke layer is shown.

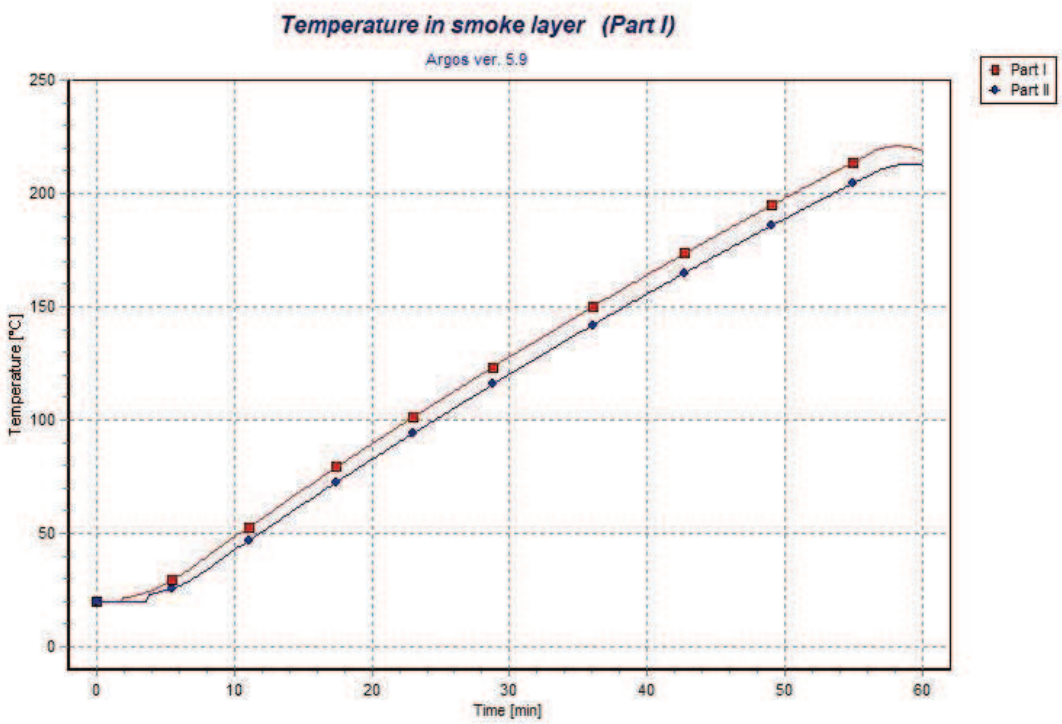
6.1 Graphs of the 5.5 MW fire started in part I



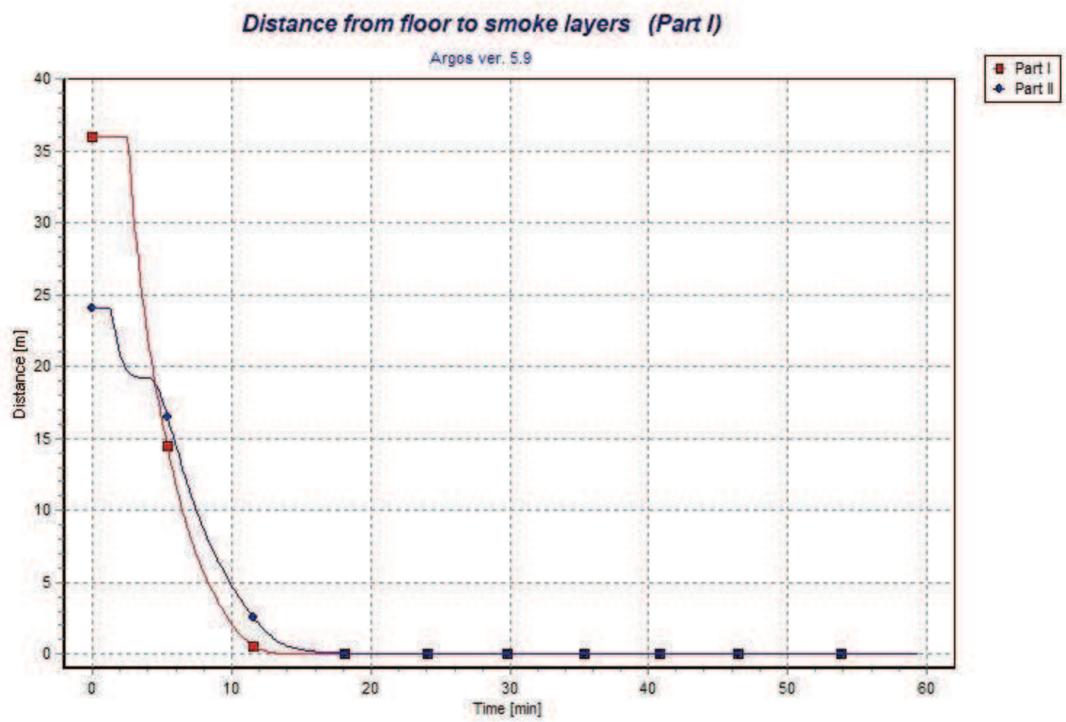


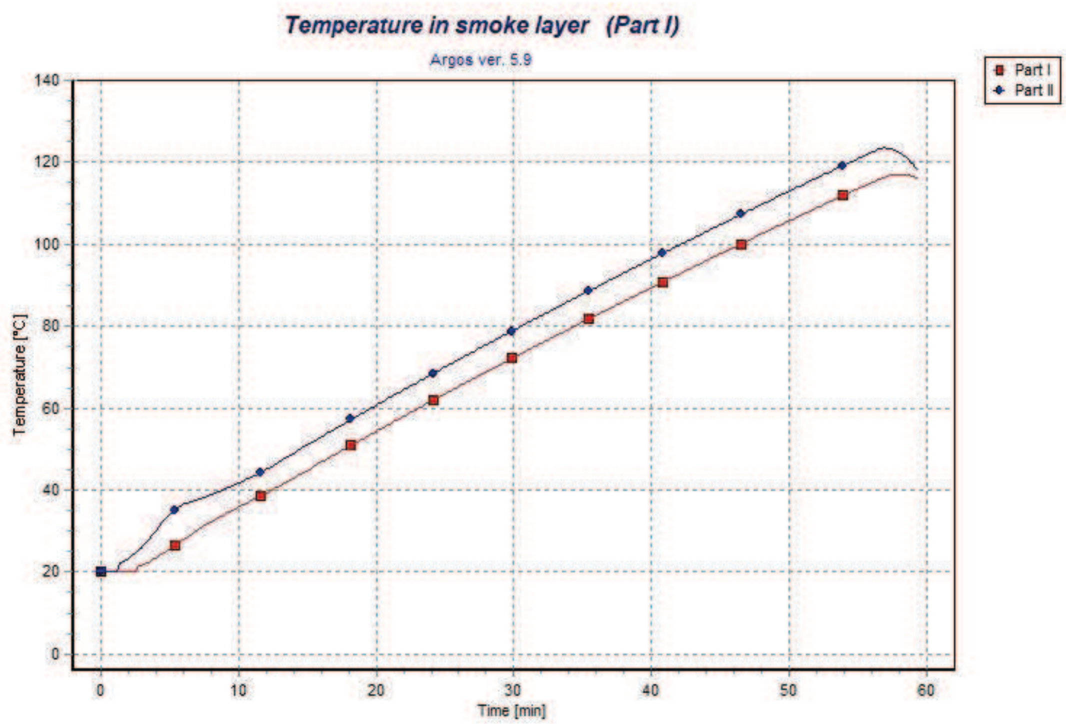
6.2 Graphs of the 11 MW fire started in part I



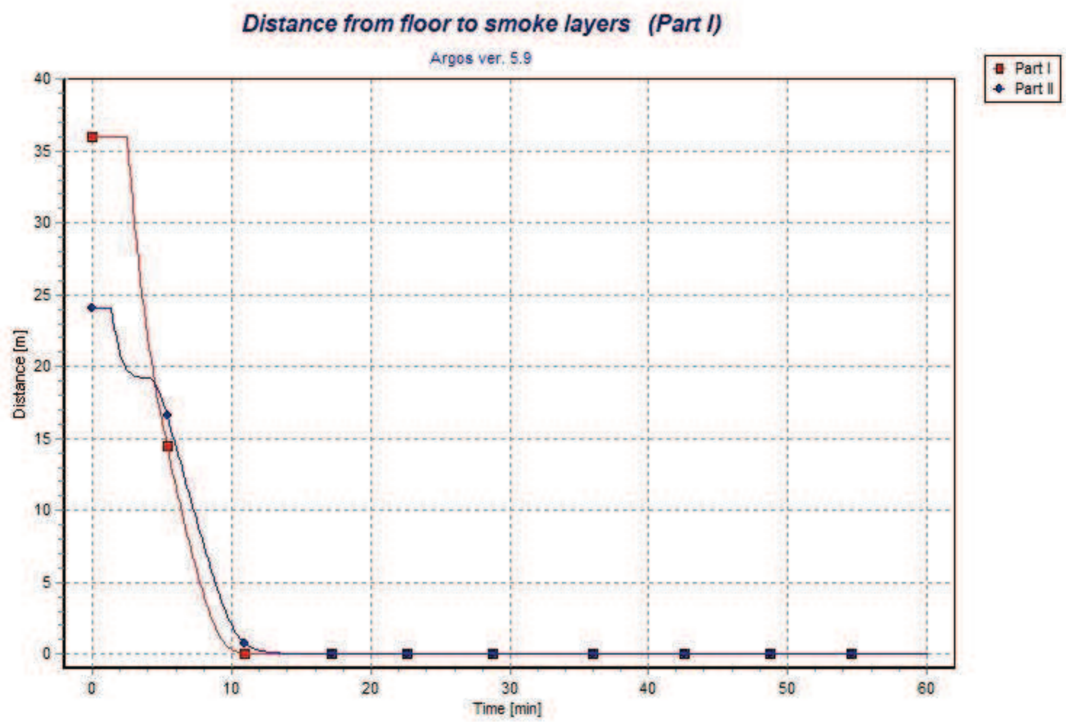


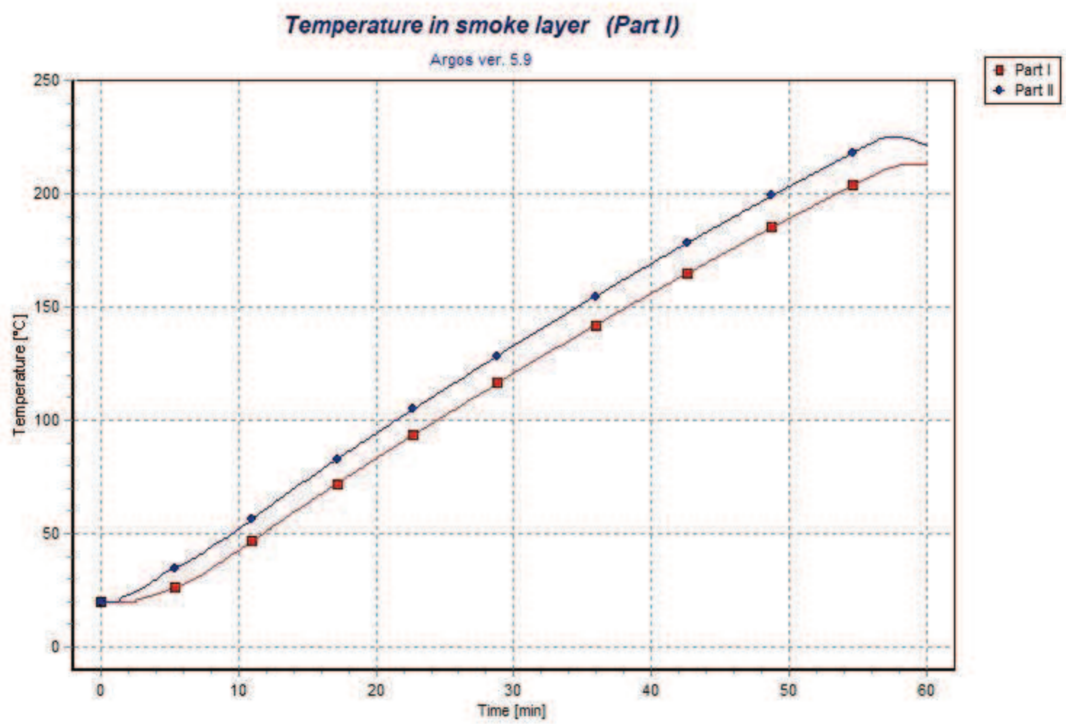
6.3 Graphs of the 5.5 MW fire started in part II





6.4 Graphs of the 11 MW fire started in part II





FLOOD RISK ASSESSMENT

HOOTON PARK SUSTAINABLE ENERGY FACILITY EASTHAM, THE WIRRAL

Prepared for:

biossence

Biossence Hooton Limited

September 2013

Prepared by:

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FLOOD RISK ASSESSMENT

HOOTON PARK SUSTAINABLE ENERGY FACILITY EASTHAM, THE WIRRAL

Report Reference Number:		P1771	
Report Issue:		Final Draft	
Report Prepared by:		**Report Reviewed & Approved by:**	
Name:	S Baker	***Name:***	H R Ling
Signature:		***Signature:***	
Date:	September 2013	***Date:***	September 2013

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FLOOD RISK ASSESSMENT

HOOTON PARK SUSTAINABLE ENERGY FACILITY EASTHAM, THE WIRRAL

TABLE OF CONTENTS

APPENDICES

FLOOD RISK ASSESSMENT

HOOTON PARK SUSTAINABLE ENERGY FACILITY EASTHAM, THE WIRRAL

1. INTRODUCTION

1.1. Biossence Hooton Limited ("Biossence") is proposing the development of an energy recovery facility (also often referred to as an Energy from Waste facility) employing gasification technology on land off North Road at Hooton Park Industrial Estate, Eastham, within the administrative area of Wirral Council.

1.2. The project already benefits from an extant planning permission granted on 29th July 2009 (reference: APP/2008/6316), which was lawfully implemented in early July 2012, by way of construction of a length of the approved access road.

1.3. Biossence proposes to make certain amendments to the configuration of the approved / implemented scheme ("the Approved Scheme"). These changes, whilst not altering the approved description of the development or the use of the land, are such that they will require a new planning permission. This amended proposal is now referred to as the Hooton Park Sustainable Energy Facility ("HOPSEF").

1.4. The HOPSEF, just like the 'Approved' scheme, would accept circa 400,000 tonnes per annum ("tpa") of waste feedstock comprising primarily commercial and industrial ("C&I") waste, although it may also take similar, pre-processed municipal solid wastes ("MSW"). It would recover both recyclable material and energy from this feedstock, with energy recovery by way of a gasification technology (again as in the Approved Scheme).

1.5. The application for the Approved Scheme contained a Flood Risk Assessment ("FRA") and gave consideration to surface water drainage, with the provision of full details of a drainage scheme being controlled by Condition 9 on the planning permission. Subsequent to the grant of the 2009 permission, it was subject to a non-material amendment. This involved the submission of a Section 96A application to Wirral Council on the 7th October 2010 which sought to amend Condition 9 to alter the surface water discharge rate from 3 litres/sec to 37.1 litres/sec and to alter the volume of the balancing pond from 2000m^3 to 350m^3.

1.6. The Section 96A application contained a proposed drainage layout plan, a proposed flood routing plan and supporting microdrainage summary reports which were produced by Mott MacDonald (see Appendix A). These clearly demonstrated that the proposed drainage system would respond to the critical 1 in 100 year (20% climate change) flood event.

1.7. Wirral Council confirmed that the information presented was sufficient to support a variation of Condition 9 and that the amendments would not have a significant detrimental impact to the ecological value of the site.

1.8. The section 96A non-material amendment was approved (27th January 2011) allowing the following amendments to Condition 9:

- *the surface water regulation system shall include measures to limit surface water run-off to a maximum allowable discharge rate of 37.1 litres/sec to the Manchester Ship Canal Company* [sic].
- *the surface water regulation system shall provide flood storage, in the form of a balancing pond with a volume of at least 350m^3 to accommodate a 1 in 100 year climate change storm event*

1.9. The proposed HOPSEF would have an impermeable surface area no greater that the Approved Scheme, and therefore, would be able to comply with the discharge rate of 37.1 litres/sec. The balancing pond would also remain at a capacity of 350m^3 and be designed in accordance with the existing plan (drawing NEB1, which is presented in Appendix B).

1.10. The Technical Guidance to the National Planning Policy Framework ("NPPF") (March 2012) advises that an FRA is mandatorily required for development proposals within Flood Zone 1, in the following circumstances:

"For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential increase in flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention."

1.11. The Environment Agency's Flood Map indicates that the HOPSEF site is located within an area of Flood Zone 1 (Low Probability) (see Map 1, Section 2.8), as defined within the Technical Guidance to the NPPF. Flood Zone 1 is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%). The site is not considered susceptible to flooding and the focus of this FRA will, therefore, relate to surface water drainage proposals to ensure that the scheme would not give rise to flooding elsewhere off-site.

2. SITE SETTING

2.1. The HOPSEF site at North Road, Hooton Park is located at Ordnance Survey Grid Reference SJ 373 799, some 1.5 km to the south-east of the centre of Eastham. The site lies wholly within the administrative area of Wirral Council, a unitary authority. The location of the site is shown on Figure 1, in Appendix B. The site location and area is identical to that for the Approved Scheme.

2.2. Junctions 5 and 6 of the M53 motorway lie approximately 1.5 km and 1 km to the south-west of the site. West Road, an industrial estate road, provides direct access from Junction 6 of the M53 to the southern boundary of the site. The access road to the site is located on North Road which is approximately half a mile from Junction 6 of the M53. As for the Approved scheme, feedstock transportation could either be by road or by boat via wharfage off the Manchester Ship Canal and arriving via the proposed access road.

2.3. The proposed development is in an industrial area on the eastern coast of the Wirral, between Eastham in the north and Ellesmere Port in the south. The site is surrounded by Oil Storage Tanks to the north and south and is adjacent to an oil refinery to the west. To the east of the site is the Manchester Ship Canal. There are four Control of Major Accident Hazards ("COMAH") sites nearby (Eastham Refinery, Alpine Storage Limited, and two sites operated by Gulf Oil (UK) Limited), three of which are adjacent to the site. The wider industrial area includes the Vauxhall car plant amongst other uses. A significant proportion of the wider industrial land is also vacant.

2.4. The nearest settlements to the proposed site are at Eastham to the north, Hooton to the south-west, and Ellesmere Port to the south. The nearest residential properties are those on the eastern fringe of Eastham, approximately 1 km to the north-west of the site, and along Rivacre Road, a minimum of 750 metres to the south-west. Properties on the northern edge of Ellesmere Port / Childer Thornton lie approximately 2 km to the south.

2.5. In terms of historic uses, the Manchester Ship Canal to the north of the proposed site was constructed between 1872 and 1898 during which time the proposed site formed part of the grounds to Hooton Hall. The land to the south was used as a race course up to the beginning of World War II, after which it was used as an airfield up to at least 1954. From a review of the historical maps the proposed site appears to have generally been undeveloped. The 1881 map shows that the proposed site lies just outside the grounds of Hooton Park; Bankfields (possibly a farm) is also shown to the north west. By 1965, the area to the south had been developed as an oil refinery and oil storage depot with an additional oil depot located 2km to the south along North Road. By that time, a motor car factory (Vauxhall Motors) had been developed to the south of the proposed site, on the southern side of North Road. Paper mills were also shown to be present further south along North Road. In addition a railway line was established serving the general industrial area, off which a siding terminated within the south western corner of the proposed site. Other than this siding, the proposed site itself has remained undeveloped.

2.6. At present (June 2013) the site comprises primarily rough grassland with areas of scrub and mature trees.

2.7. The proposed development is located approximately 4km to the west of the River Cuckmere. The whole site is located within an area designated as Flood Zone 1, Low Probability. Flood zones refer to the probability of flooding from rivers, the sea and tidal sources and ignore the presence of existing defences (existing defences are excluded as they can be breached, overtopped or may not be in existence for the lifetime of the development). Table D1 of Annex D of Planning Policy Statement 25, Development and Flood Risk ("PPS25") states the following with regard to Flood Zone 1:

> "***Zone 1 Low Probability:***
>
> ***Definition***
>
> *This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)*
>
> ***Appropriate Uses***
>
> *All uses of land are appropriate in this zone.*
>
> ***FRA Requirements***
>
> *For development proposals on sites comprising one hectare or above, the vulnerability to flooding from other sources are well as from river and sea flooding, and the potential to increase flood risk elsewhere through the additional of hard surfaces and the effect of new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention. See Annex E for minimum requirements.*
>
> ***Policy Aims***
>
> *In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques."*

2.8. The site is, therefore, at no direct risk of flooding. This is shown on the Environment Agency 1 in 1000 year flood event map (see Map 1; the application site is outlined in red).

Map 1: Environment Agency Flood Map
(source: Environment Agency Website August 2013)

Note to Map 1[1]

A floodplain is the area that would naturally be affected by flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas.

There are two different kinds of area shown on the Flood Map. They can be described as follows:

Dark blue ▪ shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year
- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue □ shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with a 0.1% (1 in 1000) or greater chance of occurring each year.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

[1] www.environment-agency.gov.uk

3. PROPOSED DEVELOPMENT

3.1. The total proposed site area is 7.6Ha, comprising 4.826 Ha of impermeable areas and 2.774Ha of permeable areas. For comparison, the Approved Scheme comprises 4.826Ha of impermeable area.

3.2. As discussed in Section 1.5, a Section 96A application was submitted to, and approved by, Wirral Council which permitted the surface water discharge rate from the site to be 37.1litres/sec. This was based on calculations undertaken by Mott MacDonald (see the Section 96a application, specifically ENC 9 – Calculation Cover Sheet, in Appendix A).

3.3. As the total impermeable area of the site is the same in the proposed scheme as it is for the Approved scheme, the maximum allowable discharge rate of 37.1litres/sec calculated for the Approved Scheme would also remain the same. Consequently the surface water regulation system will be designed in accordance with this discharge rate.

3.4. The surface water regulation system will provide flood storage, in the form of a balancing pond with a volume of 350m^3 to accommodate a 1 in 100 year climate change storm event (in line with the Approved Scheme).

4. RISK FROM VARIOUS FLOODING MECHANISMS

4.1. Flooding From Rivers and Sea

As the application site is in Flood Zone 1 it is at low probability of being at risk of flooding from rivers or sea.

4.2. Flooding From Land

4.2.1. During periods of prolonged or intense rainfall, open ground can quickly become water logged, drainage systems may become overloaded and, as a result, can lead to localised flooding. In developed areas, flood water can become polluted with domestic sewage where foul sewers surcharge and overflow which can cause further environmental issues.

4.2.2. The surface water regulation system will be designed to convey, under pipe full conditions, a rainfall duration event of 15-1440 minutes and will ensure there will be no surface flooding during a rainfall storm with a return period of 100 years (including allowing 20% of climate change). The system will be designed in accordance with BS EN 752 – 1 to 4: *Drain and Sewer Systems Outside Buildings*.

4.2.3. A surface water runoff is further discussed in Section 5 of this report. Based on the information available, and the drainage systems to be implemented, the application site is not considered to be at risk from flooding from land.

4.3. Flooding From Groundwater

4.3.1. Groundwater flooding can occur when the water levels in the ground rise above surface elevations. It is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive regional aquifers, such as chalk or sandstone, or may be localised in gravels in valley bottoms underlain by less permeable rocks.

4.3.2. Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into the rivers. In particularly wet winters, rising water levels may lead to flooding of normally dry land, as well as reactivating flow in 'bournes' - intermittent streams that only flow for part of the time, when groundwater levels are high.

4.3.3. Groundwater flooding may take weeks or months to dissipate because groundwater flow is much slower than surface flow and water levels thus take much longer to fall.

4.3.4. As identified in the EIA submitted for the Approved Scheme, the proposed development overlies a major aquifer. These are often highly permeable formations with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public water supply. The sandstone aquifer is located at approximately 3m below the site[2]. However, the site is also underlain by significant deposits of clay which provide an impervious layer[2].

4.3.5. A site investigation was undertaken by Geotechnics in March 2012. This comprised three cable percussion boreholes, eight trial pits, six hand dug pits and twelve window sample boreholes. No groundwater was observed during the investigation, with the exception of a limited quantity (insufficient to take any samples of) in four of the window samples. Groundwater installations were installed into all of the boreholes drilled, however, no groundwater was encountered during drilling or during the two subsequent monitoring visits.

4.3.6. Consequently, although the site is underlain by a major aquifer, as only a limited quantity of groundwater was encountered during the site investigation, it is unlikely that the site is at risk flooding from groundwater. No further action is considered to be required.

4.4. Flooding From Reservoirs, Canals and Other Artificial Sources

4.4.1. Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operational and redundant industrial processes which can include mining, quarrying and sand and gravel extractions. These activities may increase floodwater depths and velocities in the area.

4.4.2. The potential effects of flood risk management infrastructure and other structures also need to be considered. Reservoir or canal flooding may occur as a result of the facility of being overwhelmed and/or as a result of dam or bank failure. The latter can happen suddenly resulting in rapidly flowing deep water that can cause a significant threat to life and major property damage.

4.4.3. The only conceivable mechanism of flooding from the canal would be bank failure of the Manchester Ship Canal ("MSC"). The MSC is a well maintained modern waterway and still an important shipping route so the prospect of bank failure seems extremely improbable.

4.4.4. Consequently it is unlikely that the site is at risk from flooding from the adjacent Manchester Ship Canal. No further action is considered to be required.

[2] See ExCAL Report 53-01-06/EIA/KKE, June 2008, Chapter 2 – Submitted with the Approved Scheme

4.5. Climate Change

4.5.1. The Environment Agency Flood Map and Flood Zones do not currently take account of climate change impacts.

4.5.2. Annex B of PPS25 provides recommended contingency allowances for nett sea level rise. Taking a worst case scenario by the year 2115, the sea is predicted to rise by 0.987metres (relative to 1990 levels) in the north west of England (Annex B, PPS25).

4.5.3. The tides at Eastham are based on the Standard Port of Liverpool (Alfred Dock) which has a highest astronomical tide of 10.5 metres above chart datum. At Eastham, the mean high water spring tides are 0.3 metres higher, making 10.8 meters in total. The chart datum is 4.93 metres below ordnance datum (BOD"). Therefore, the highest astronomical tide is 5.87 metres above ordnance datum ("AOD"). Should the sea level rise as predicted, the highest astronomical tide in 2115 would be 6.857 metres AOD.

4.5.4. The application site is currently at a level of 13.0 metres AOD (at its lowest point), and, therefore, even when climate change is taken into account, by the 2115, the site would remain 6.143 metres above sea level. Consequently, the site is not at risk from the effects of climate change. No further action is considered to be required.

5. THE EFFECTS OF THE DEVELOPMENT AND THE MEASURES PROPOSED TO TAKE ACCOUNT OF THESE EFFECTS

5.1. Introduction

5.1.1. The main effect of the development will be to reduce the permeability of 63.5% of the application site. This will have the immediate effect of changing the site's response to rainfall, however, appropriate surface water drainage arrangements will be required to satisfactorily manage flood risk in a new development of this nature.

5.1.2. The effective disposal of surface water from the development is a material planning consideration in determining proposals for the development and use of land.

5.1.3. The drainage strategy and plan prepared for the "Approved" scheme will be implemented in order to comply with the maximum permissible discharge rate of 37.1litres/sec.

5.2. Surface Water

5.2.1. The surface water regulation system will be designed to convey, under pipe full conditions, a rainfall duration event of 15-1440 minutes and will ensure there will be no surface flooding during a rainfall storm with a return period of 100 years (including allowing 20% of climate change). The system will be designed in accordance with BS EN 752 – 1 to 4.

5.2.2. Highway sections will be drained by means of gullies and combined kerb and drainage systems. Drainage channels and gullies will be provided to car parks, hardstandings and all other associated paved areas.

5.2.3. A Class 1 bypass oil interceptor will be provided on discharges from roads, car parks, hardstandings and paved areas potentially contaminated by oils.

5.2.4. Manholes will be located external to the buildings wherever possible. Where unavoidable, manholes will be sealed, locked and located in accessible areas for maintenance.

5.2.5. Pipe diameters and gradients will be selected to encourage self cleansing of the pipework.

5.3. Foul Water/Effluent

5.3.1. Domestic Foul flows contributing to the system will be evaluated using the method of discharge units as outlined in BS EN 12056 – 2 2000; *Gravity Drainage Systems Inside Buildings.*

5.3.2. Internal foul drainage to the main building process plant will be designed in accordance of known base flows discharging from the individual process plant provided by the plant designer.

5.3.3. It is expected that a primary neutralisation tank will be required for the recycling process waste prior to entering the public sewerage system.

5.3.4. Manholes will be located external to the buildings wherever possible. Where unavoidable, manholes will be sealed, locked and located in accessible areas for maintenance.

5.3.5. Areas designated for storage of oils and other liquid hazardous materials will be situated within containment bunds with provision for isolation and independent drainage.

5.3.6. Pipe diameters and gradients will be selected to encourage self-cleansing of the pipework

5.4. Firewater

5.4.1. A suitable fire strategy will be required on the application site. This issue is particularly important considering the nature of the materials to be used on site. Consequently, a sprinkler system will be installed at the proposed HOPSEF.

5.4.2. The water used to extinguish any fire will be potentially contaminated therefore will need to be collected and chemically tested to determine the most appropriate disposal method. Firewater will therefore be collected in a dedicated holding tank on site.

APPENDIX A

Section 96a Application

ENC. 1

PLANNING PORTAL

Application for a non-material amendment following a grant of planning permission.

Town and Country Planning Act 1990

DRAFT

Publication of applications on planning authority websites

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website. If you require any further clarification, please contact the Authority's planning department.

Please complete using block capitals and black ink.
It is important that you read the accompanying guidance notes as incorrect completion will delay the processing of your application.

1. Applicant Name and Address

Title:	
First name:	
Last name:	
Company (optional):	MERSEY GREEN SOLUTION FACILITIES MANAGEMENT LTD
Unit:	
House number:	
House suffix:	
House name:	
Address 1:	KEY HOUSE
Address 2:	EBBLAKE INDUSTRIAL ESTATE
Address 3:	
Town:	VERWOOD
County:	DORSET
Country:	ENGLAND
Postcode:	BH31 6AT

2. Agent Name and Address

Title:	MR
First name:	TADEUSZ
Last name:	BLESZYNSKI
Company (optional):	NEW EARTH SOLUTIONS LTD
Unit:	
House number:	
House suffix:	
House name:	
Address 1:	KEY HOUSE
Address 2:	EBBLAKE INDUSTRIAL ESTATE
Address 3:	
Town:	VERWOOD
County:	DORSET
Country:	ENGLAND
Postcode:	BH31 6AT

3. Site Address Details

Please provide the full postal address of the application site.

Unit:	
House number:	
House suffix:	
House name:	
Address 1:	LAND NORTH OF NORTH ROAD
Address 2:	
Address 3:	
Town:	EASTHAM
County:	WIRRAL
Postcode (optional):	CH65 1AJ

Description of location or a grid reference.
(must be completed if postcode is not known):

Easting: Northing:

Description:

4. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application? ☑ Yes ☐ No

If Yes, please complete the following information about the advice you were given. (This will help the authority to deal with this application more efficiently).

Please tick if the full contact details are not known, and then complete as much as possible: ☐

Officer name: MATTHEW RASHTON

Reference:

Date of advice (DD/MM/YYYY): 07/06/2010

Details of pre-application advice received:

LETTER ADVISING OF NEED TO SEEK VARIATION IN PLANNING CONDITION

5. Eligibility

Do you, or the person on whose behalf you are making this application, have an interest in the part of the land to which this amendment relates? ☑ Yes ☐ No

If you have answered No to this question, you cannot apply to make a non-material amendment.

If you are not the sole owner, has notification under article 4F(3) of the GDPO been given? ☐ Yes ☐ No ☐ Not Applicable

If you have answered No to this question, you cannot apply to make a non-material amendment.

If you have answered Yes to this question, please give details of persons notified:

Person Notified	Address	Date of Notification
PEEL ENVIRONMENTAL LTD	PEEL DOME, THE TRAFFORD CENTRE, MANCHESTER M17 8PL	
THE MANCHESTER SHIP CANAL COMPANY	MARITIME CENTRE, PORT OF LIVERPOOL, LIVERPOOL MERSEYSIDE L21 1LA	
PEEL LAND AND PROPERTY (PORTS LIMITED)	PEEL DOME, THE TRAFFORD CENTRE, MANCHESTER M17 8PL	

6. Authority Employee / Member

With respect to the Authority, I am:
(a) a member of staff
(b) an elected member
(c) related to a member of staff
(d) related to an elected member

Do any of these statements apply to you? ☐ Yes ☑ No

If yes please provide details of the name, relationship and role

7. Description Of Your Proposal

Please provide a description of the approved development as shown on the decision letter, including application reference number and date of decision in the sections below. Please also provide the original application type:

ERECTION OF A WASTE RECOVERY PLANT TOGETHER WITH HEAT AND POWER PLANT, ANCILLARY BUILDINGS, PLANT AND ASSOCIATED INFRASTRUCTURE.

APP/2008/6316 DECISION DATE: 29th JULY 2009

Reference number: APP/2008/6316

Date of decision (DD/MM/YYYY): 29/07/2009

What was the original application type?: (e.g. 'Full', 'Householder and Listed Building', 'Outline') FULL PLANNING APPLICATION

For the purpose of calculating fees, which of the following best describes the original application type?

Householder development: development to an existing dwelling-house or development within its curtilage ☐

Other: anything not covered by the above category £170.00 FEE ☑

8. Non-Material Amendment(s) Sought

Please describe the non-material amendment(s) you are seeking to make:

VARIATION TO CONDITION 9 TO ALTER SURFACE WATER DISCHARGE RATE OF 3 L/SEC TO THE MANCHESTER SHIP CANAL TO A MAXIMUM OF 37.1 L/SEC AND PROVIDING ~~350~~ 350 m^3 STORAGE VOLUME INSTEAD OF 2000 m3 IN BALANCING POND

AMENDMENT TO CONDITION 21 DRAWING R24:06:2PC TO MODIFY SHAPE OF BALANCING POND AS SHOWN ON DRAWINGS 256150/CAR/001 P3 256150/CAR/002 P3, HP-258633-SL-001 P2-DISCHARGE TO CANAL, HP-258633-SL-001 P2 - FLOOD ROUTING

Are you intending to substitute amended plans or drawings? ☐ Yes ☑ No

If Yes, please complete the following:

Old plan/drawing number(s):

New plan/drawing number(s):

Please state why you wish to make this amendment:

CONDITION 9 : 3L/SEC CONFIRMED INCORRECT BY EA AND MSCC RESULTING IN 2000m^3 VOLUME ALSO INCORRECT. CORRECTION TO 37.1 L/SEC RESULTS IN LOWER VOLUME OF ~~355~~ 350 m^3 STORAGE CAPACITY REQUIRED

CONDITION 21 : CHANGE TO SHAPE OF POND TO INCREASE BIO-DIVERSITY WITH CONFIRMATION OF VOLUME OF ~~355~~ 350 m3 TO BE CONSISTENT WITH PROPOSED CHANGE TO CONDITION 9.

9. Application Requirements - Checklist

Please read the following checklist to make sure you have sent all the information in support of your proposal. Failure to submit all information required will result in your application not being accepted. It will not be accepted until all information required by the Local Planning Authority has been submitted.

The original and 3 copies of a completed and dated application form: ☑

The original and 3 copies of other plans and drawings or information necessary to describe the subject of the application: ☑

The correct fee: ☑ £170.00

10. Declaration

I/We hereby apply for planning permission/consent as described in this form and the accompanying plans/drawings and additional information.

Signed - Applicant:	Or signed - Agent:	Date (DD/MM/YYYY):
	T. Bleszynski	

11. Applicant Contact Details

Telephone numbers

Country code:	National number:	Extension number:

Country code:	Mobile number (optional):

Country code:	Fax number (optional):

Email address (optional):

12. Agent Contact Details

Telephone numbers

Country code:	National number:	Extension number:
	01202 812300	

Country code:	Mobile number (optional):

Country code:	Fax number (optional):

Email address (optional): ted.bleszynski@newearthgroup.co.uk

13. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land? ☐ Yes ☑ No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact? *(Please select only one)* ☑ Agent ☐ Applicant ☐ Other (if different from the agent/applicant's details)

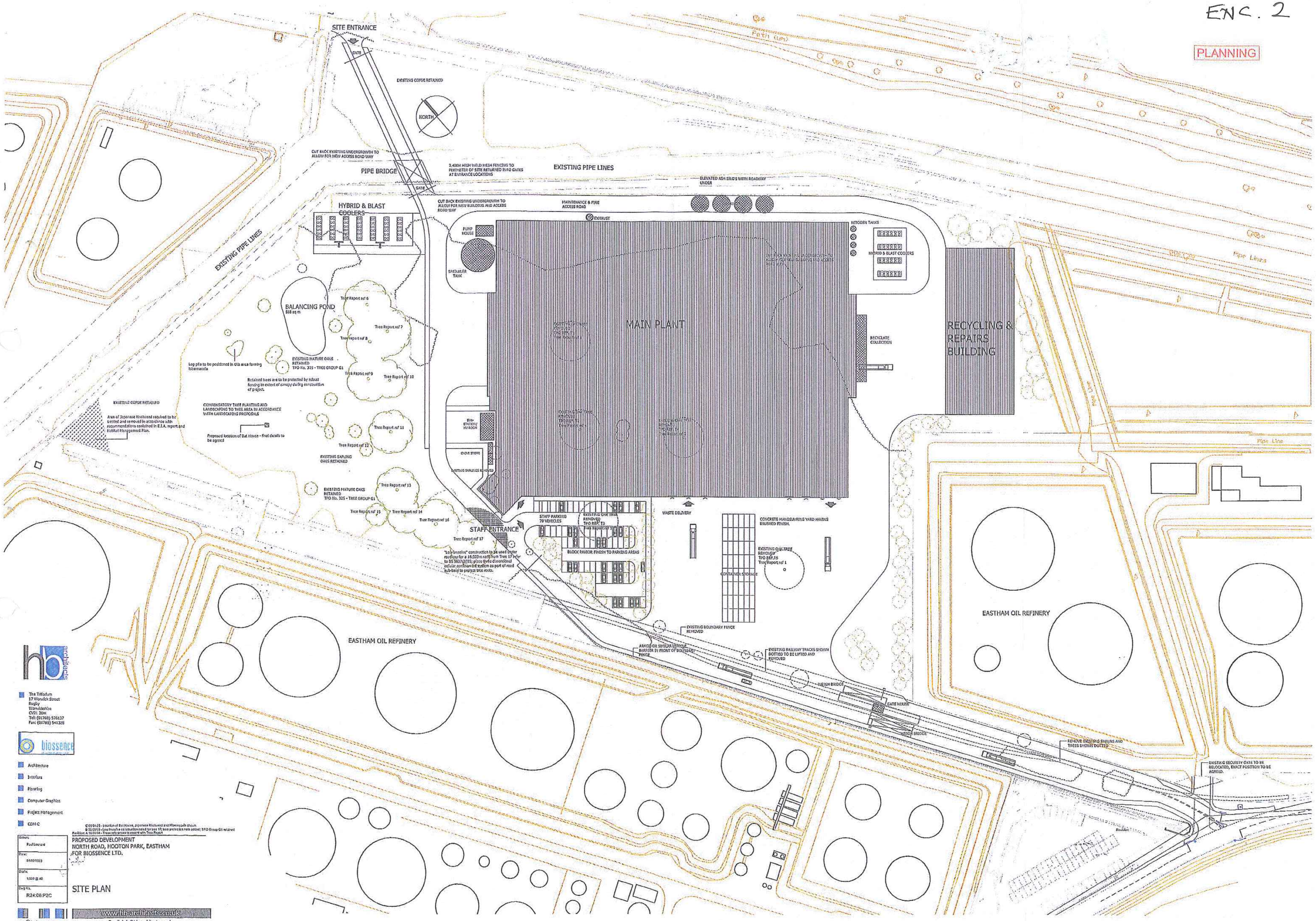
If Other has been selected, please provide:

Contact name:	Telephone number:

Email address:

ENC. 2

PLANNING



The Triforium
17 Warwick Street
Rugby
Warwickshire
CV21 3DH
Tel: (01788) 576137
Fax: (01788) 541328

- Architecture
- Interiors
- Planning
- Computer Graphics
- Project Management
- CDM-C

C 03.01.09 - Location of Bat House, Japanese Knotweed and Hibernacula shown
B 30.09.08 - Low invasive construction noted for tree 17; tree protection note added; TPO Group G1 retained
Revision: A 10.09.08 - Tree references to accord with Tree Report

Drawn: Paul Leonard	PROPOSED DEVELOPMENT NORTH ROAD, HOOTON PARK, EASTHAM FOR BIOSSENCE LTD.
Date:	
Scale: 1:500 @ A0	
Dwg No. R24:06:P2C	SITE PLAN

www.hb-architects.co.uk
Email. info@hb-architects.co.uk

Notes

1. Do not scale any items or information from this drawing.

ENC 3

LANDSCAPE STRATEGY

General

There is a significant amount of existing vegetation on the site, particularly along the boundaries. This provides screening from adjacent areas as well as providing attractive local amenity and wildlife habitats. Most of the scrub around the perimeter is to be retained wherever possible and additional planting carried out to reinforce the habitats and increase screening.

Additional planting will be carried out to create new woodland planting areas, reinforcing the existing wildlife corridors.

Native species will be used which reflect and enhance the existing character. A separate Aboricultural Report and Tree Clearance Plan (256150/CAR/004) has been drawn up which details the individual trees to be removed and remedial works.

Wildlife Habitat Zone (North-Western Section of the Site)

This area of the Site is to be retained in its present state where possible. This is to include retention of grassland areas, scrub and trees.

Japanese Knotweed infected area is to be fenced off to the west section. For the purposes of this scheme, the area of scrub to this area is to be left unmanaged for the duration of the control programme (3 years).

A new balancing pond is to be created within this area to compensate for water bodies lost to the development. The pond will be designed and maintained to encourage a new wildlife habitat for the area. The pond will provide various new habitats to increase the ecological value of the site and will include aquatic areas, mixed grassland and scrub.

The 5no Oak trees to be removed from the Development area are to be felled in large sections and moved to the north-western area of the site, and laid horizontally in an area as shown on the plan. These will provide valuable wildlife habitats and a visual feature within this area. Branches from the tree felling will also be left in log piles to create habitats for amphibians close to the pond.

Landscape management work is to be carried out on all existing retained areas of scrub (Refer to Landscape Management Schedule).

Within the scrub area at the boundaries of the Wildlife Habitat Zone, the immature Sycamores will be removed and replaced with native species to diversify the scrub areas and increase their habitat value for wildlife.

Northern, Southern and Eastern Boundary Treatment

The northern and southern hedgerow will be removed during construction and is to be replaced with new boundary hedgerow planting. The new planting will consist of a matrix of native tree and shrub species.

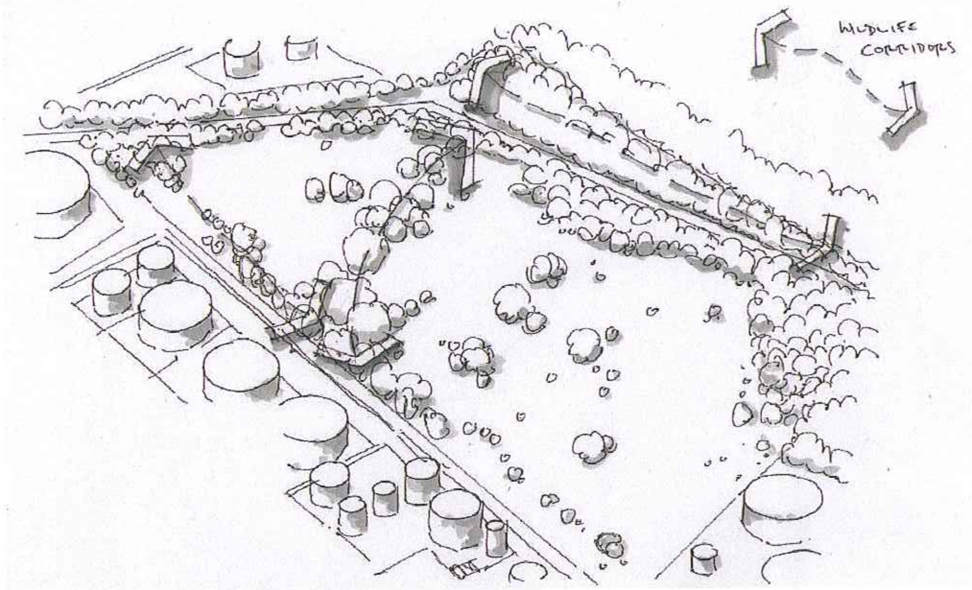
Species rich grassland will replace the existing grassland that is lost to the development. This will be mown once a year to provide further wildlife habitats.

Car Park Area

More formal tree and shrub planting is proposed to main entrance area of the development. Low groundcover shrub planting of low maintenance species and trees with clear stems to ensure good visibility of the car park area and entrance area will be specified.

Management Plan

It is proposed that a long term management plan is created for the site. This will include phased removal of trees as they become over mature and will detail additional planting to replace them. This plan will also set out the long term management of the wildlife habitat zone in detail.



Key to Symbols

- Existing Tree to be Retained
- Existing Trees Lost to Development
- Existing Copse to be Retained
- Proposed Woodland Tree Planting
- Proposed Specimen Tree
- Proposed Balancing Pond
- Proposed Earth Mounding
- Proposed Boundary Hedgerow
- Proposed Shrub Planting
- Proposed Grass Seeding
- Proposed Large Log Feature Area (Sections to be Taken From 5 no. Large Oaks in Development Area).
- Proposed Wildlife Habitant Zone
- Japanese Knotweed Control Area
- Existing Tussock Grassland Retained

Rev.	Date	Drawn	Description	Chk'd.	App'd.
P3	03-07-10	NLM	Amended for approval of Condition 4	NJ	*
P2	04-06-09	NLM	Balancing Pond Amended	NJ	*
P1	11-05-09	NLM	Issued for Approval	NJ	*

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Fax +44 (0)292 046 7801
Web www.mottmac.com

Client

NEW EARTH
BIOSSENCE LTD
HOOTON PARK E.F.W

Title

North Road Recycling Plan
Hooton Park – Eastham
Landscape Strategy

Designed	N Jones	NJ	Eng.Chk.	N Jones	NJ
Drawn	NL Moktan	NLM	Coordination	N Jones	NJ
Dwg.Chk.	TP Marsh	TPM	Approved	•	•

Scale at A1: 1:1000

Project: 256150

CAD file

Status: PRE

Drawing No: 256150/CAR/001

Rev: P3

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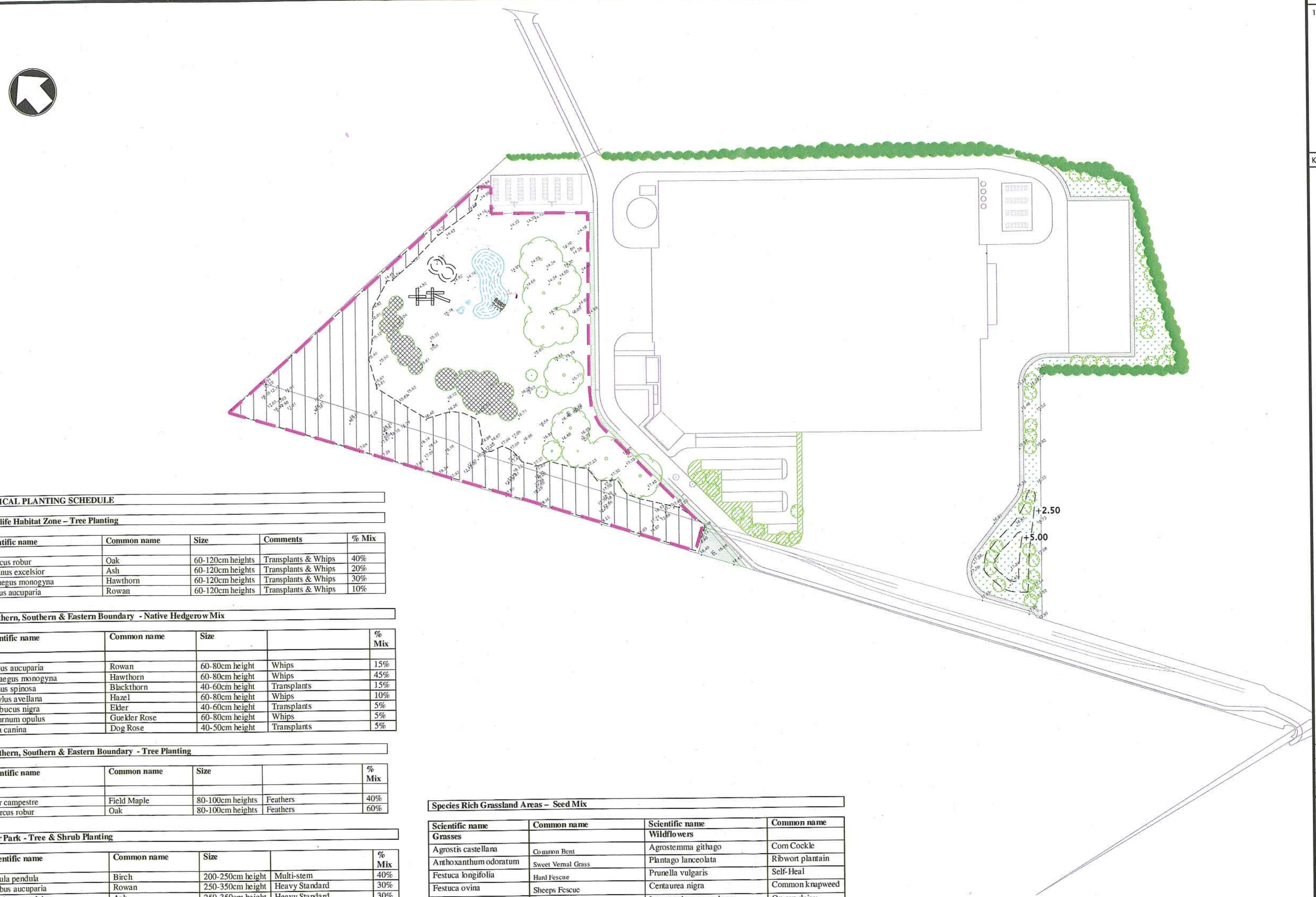
1. Do not scale any items or information from this drawing.

ENC 4



Key to Symbols

- Existing Tree to be Retained
- Existing Copse to be Retained
- Proposed Woodland Tree Planting
- Proposed Specimen Tree
- Proposed Balancing Pond
- Proposed Earth Mounding
- Proposed Boundary Hedgerow
- Proposed Shrub Planting
- Proposed Species Rich Grass Seeding
- Proposed Large Log Feature Area (Sections to be Taken From 5 no. Large Oaks in Development Area).
- Proposed Wildlife Habitant Zone
- Proposed Amenity Grass Seeding to Verge
- Existing Levels
- +5.00 Proposed Levels

TYPICAL PLANTING SCHEDULE

Wildlife Habitat Zone – Tree Planting

Scientific name	Common name	Size	Comments	% Mix
Quercus robur	Oak	60-120cm heights	Transplants & Whips	40%
Fraxinus excelsior	Ash	60-120cm heights	Transplants & Whips	20%
Crataegus monogyna	Hawthorn	60-120cm heights	Transplants & Whips	30%
Sorbus aucuparia	Rowan	60-120cm heights	Transplants & Whips	10%

Northern, Southern & Eastern Boundary - Native Hedgerow Mix

Scientific name	Common name	Size		% Mix
Sorbus aucuparia	Rowan	60-80cm height	Whips	15%
Crataegus monogyna	Hawthorn	60-80cm height	Whips	45%
Prunus spinosa	Blackthorn	40-60cm height	Transplants	15%
Corylus avellana	Hazel	60-80cm height	Whips	10%
Sambucus nigra	Elder	40-60cm height	Transplants	5%
Viburnum opulus	Guelder Rose	60-80cm height	Whips	5%
Rosa canina	Dog Rose	40-50cm height	Transplants	5%

Northern, Southern & Eastern Boundary - Tree Planting

Scientific name	Common name	Size		% Mix
Acer campestre	Field Maple	80-100cm heights	Feathers	40%
Quercus robur	Oak	80-100cm heights	Feathers	60%

Car Park - Tree & Shrub Planting

Scientific name	Common name	Size		% Mix
Betula pendula	Birch	200-250cm height	Multi-stem	40%
Sorbus aucuparia	Rowan	250-350cm height	Heavy Standard	30%
Fraxinus excelsior	Ash	250-350cm height	Heavy Standard	30%
Cotoneaster species	-	3L	Container Grown	30%
Hebe species	-	3L	Container Grown	30%
Lonicera species	-	3L	Container Grown	40%

Balancing Pond – Planting Mix

Scientific name	Common name	Size	Comments	% Mix
Caltha palustris	Marsh Marigold	12-14cm Plugs		12%
Iris pseudacorus	Yellow Iris	12-14cm Plugs		14%
Myosotis scorpiodes	Water Forget Me Not	12-14cm Plugs		12%
Mentha aquatica	Water Mint	12-14cm Plugs		14%
Nasturtium aquaticum	Water-Cress	12-14cm Plugs		12%
Phalaris arundinacea	Reed Canary Grass	12-14cm Plugs		12%
Veronica beccabunga	Brooklime	12-14cm Plugs		12%
Sparganium erectum	Branched Bur-weed	12-14cm Plugs		12%

Species Rich Grassland Areas – Seed Mix

Scientific name	Common name	Scientific name	Common name
Grasses		Wildflowers	
Agrostis castellana	Common Bent	Agrostemma githago	Corn Cockle
Anthoxanthum odoratum	Sweet Vernal Grass	Plantago lanceolata	Ribwort plantain
Festuca longifolia	Hard Fescue	Prunella vulgaris	Self-Heal
Festuca ovina	Sheeps Fescue	Centaurea nigra	Common knapweed
		Laeucanthemum vulgare	Ox-eye daisy
		Primula veris	Cowslip
		Lotus corniculatus	Birdsfoot trefoil
		Anthemis arvensis	Corn Chamomile
		Centaurea cyanus	Cornflower
		Chrysanthemum segetum	Corn Marigold
		Digitalis purpurea	Foxglove
		Hypericum perforatum	St John's Wort
		Papaver rhoeas	Corn Poppy
		Silene alba	White Campion
		Vicia sativa	Common Vetch
		Rhinanthus minor	Yellow Rattle

Amenity Grass – Seed Mix

To be mix 'A19 Mixture' as supplied by British Seed Houses UK

Rev.	Date	Drawn	Description	Chk'd.	App'd.
P3	03-07-10	NLM	Amended for approval of Condition 4	NJ	*
P2	02-06-09	NLM	Balancing Pond Amended	NJ	*
P1	11-05-09	NLM	Issued For Approval	NJ	*

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Client

NEW EARTH
BIOSSENCE LTD
HOOTON PARK E.F.W.

Title

North Road Recycling Plan
Hooton Park - Eastham
Landscape Proposals
Softworks Masterplan

Designed	N Jones	NJ	Eng.Chk.	N Jones	NJ
Drawn	NL Moktan	NLM	Coordination	N Jones	NJ
Dwg.Chk.	TP Marsh	TPM	Approved	*	*

Scale at A1: 1:1000
Project: 256150
CAD file:
Status: APR
Drawing No: 256150/CAR/002
Rev: P3

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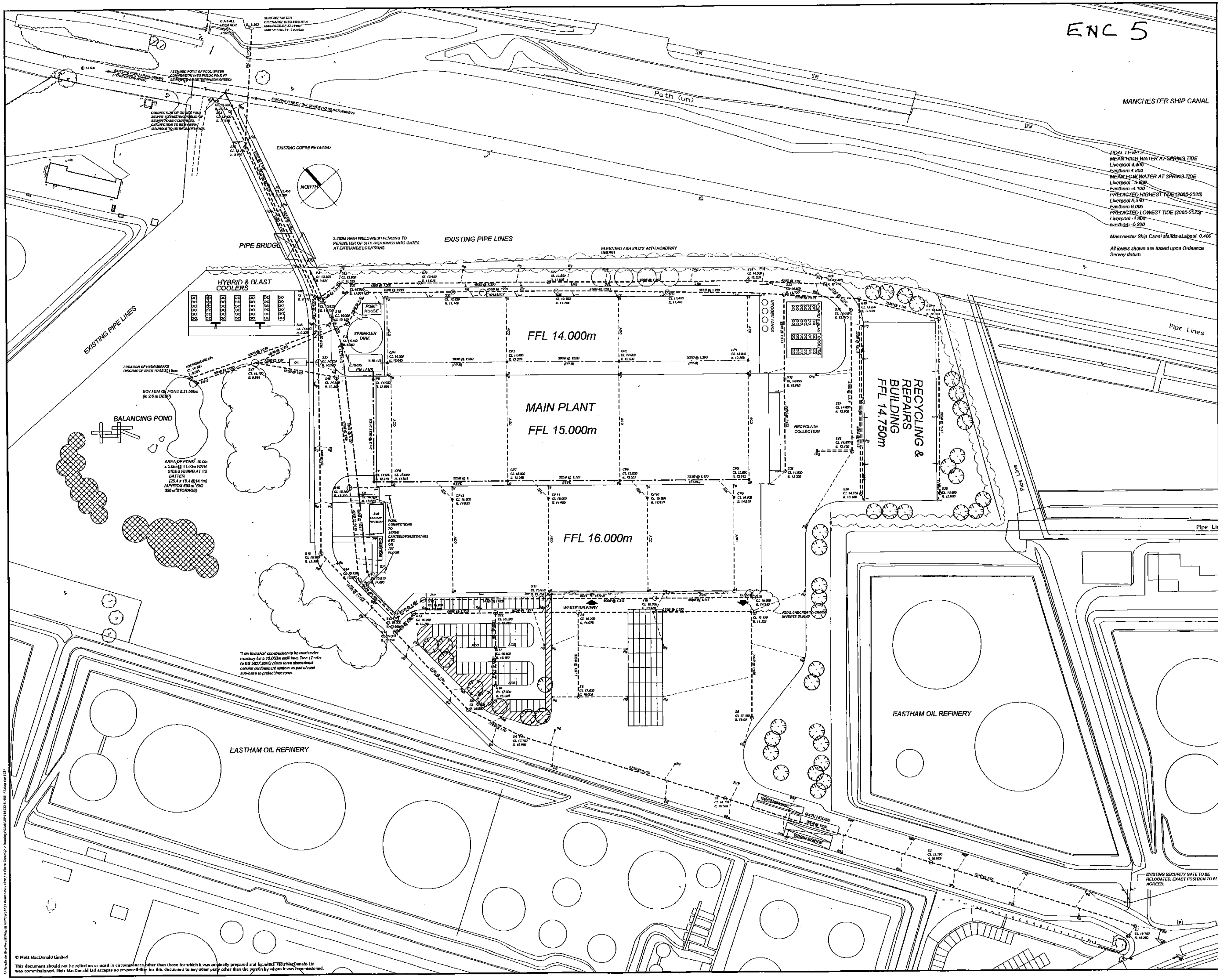
P:\Manchester\Manchester\Northwest\Projects (Even)\256150_Hooton_New_Earth\5.0 Incoming Information\5.1 Drawings\Drawings 2\Landscape\Revision P3\256150_CAR_002 P3.dwg - 05/08/2010 11:36:38
- Jones, Neil D

ENC 5



Notes

KEY

EXTERNAL DRAINAGE

- PROPOSED SURFACE WATER SEWER CLASS 'H' CONCRETE & MANHOLE
- PROPOSED FOUL WATER SEWER EXTRA STRENGTH VITRIFIED CLAY PIPE & MANHOLE
- PROPOSED PETROL INTERCEPTOR
- PRIMARY NEUTRALISATION TANK TO BS6007
- PROPOSED ROAD GULLY
- PROPOSED DOUBLE ROAD GULLY
- PROPOSED ACO CHANNEL
- FOUL WATER CONNECTIONS TO BE TRAPPED
- BACK DROP

INTERNAL PLANT PROCESSDRAINAGE

- CHEMFLOW (PP-B) BEIGE GREY POLYPROPYLENE PIPE WITH 6 BAR RATING & THERMOFUSION JOINTS
- CATCHPIT MANHOLE, DOUBLE SEALED & LOCKED
- PROPOSED FOUL WATER, EXTRA STRENGTH VITRIFIED CLAY PIPE
- ACO CHANNEL - S200, CLASS E
- INTERNAL GULLY WITH STAINLESS STEEL CATCHMENT BASKET

Key to symbols

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	05.08.10	D.M.S.	VARIOUS DRAINAGE CHANGES DUE TO LAYOUT REF: 256150/CAR/001-P2.	B.S.	F.T.
P1	07.10.09	M.F.	CLIENT DETAILS AMMENDED.	T.C.	S.T.T.

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Fax +44 (0)161 926 4100
Web www.mottmac.com

Client: NEW EARTH BIOSSENCE LTD HOOTEN PARK E.F.W.

Title: NORTH ROAD RECYCLING PLANT HOOTON PARK - EASTHAM PROPOSED DRAINAGE LAYOUT DISCHARGE TO CANAL -37 l/sec MAX

Designed	DMS	Eng.Chk.	
Drawn	LS	Coordination	ST
Dwg.Chk.	BS	Approved	FT
Scale at A0	1:500	Project	258633
CAD File		Status	PRE
Drawing No	HP-258633-SL-001	Rev	P2

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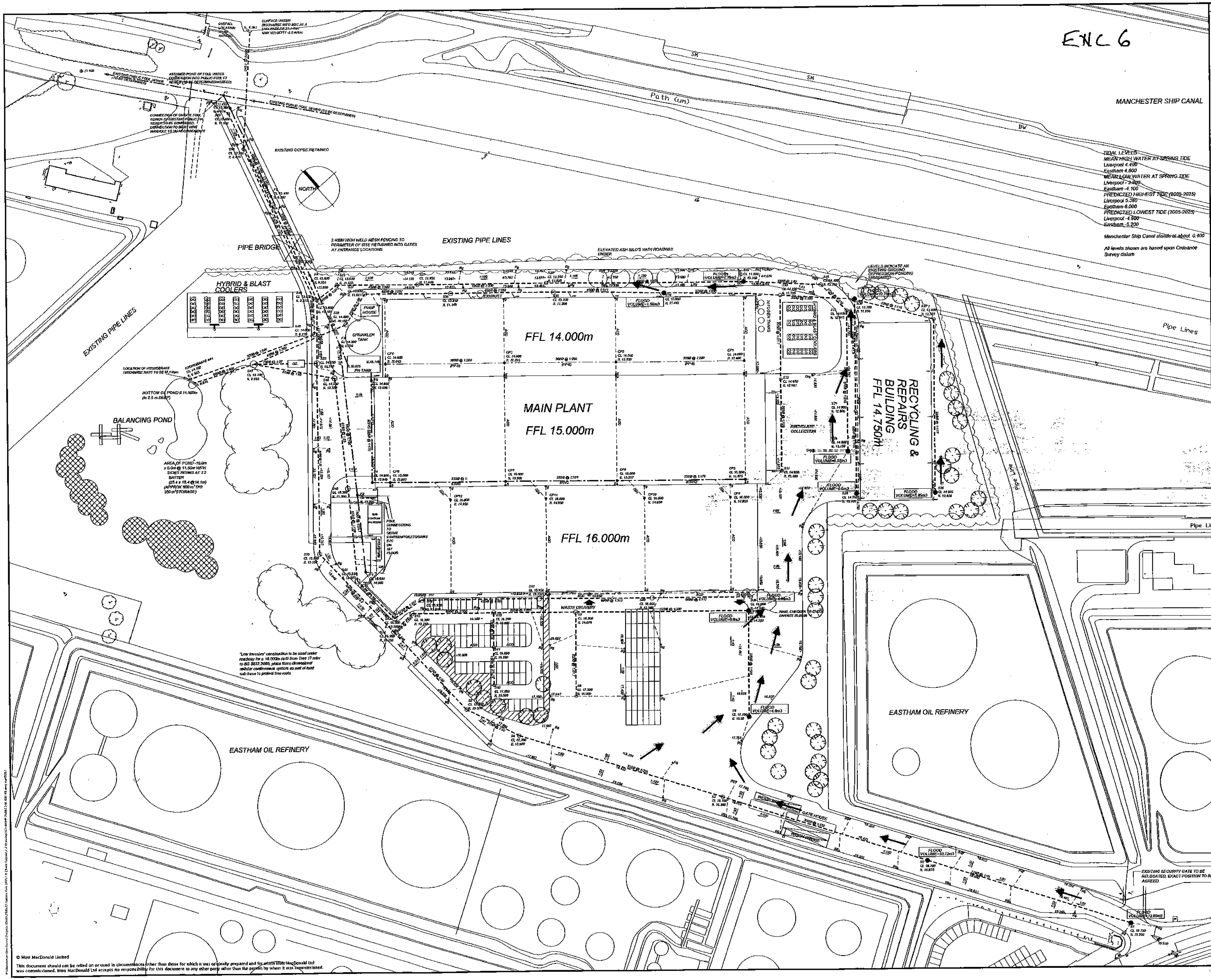

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TIDAL LEVELS
MEAN HIGH WATER AT SPRING TIDE
Liverpool 4.400
Eastham 4.800
MEAN LOW WATER AT SPRING TIDE
Liverpool - 3.800
Eastham -4.100
PREDICTED HIGHEST TIDE (2005-2025)
Liverpool 5.360
Eastham 6.000
PREDICTED LOWEST TIDE (2005-2025)
Liverpool -4.900
Eastham -5.200

Manchester Ship Canal stands at about 0.400

All levels shown are based upon Ordnance Survey datum

Notes

KEY

EXTERNAL DRAINAGE

- PROPOSED SURFACE WATER SEWER CLASS 'M' CONCRETE & MANHOLE
- PROPOSED FOUL WATER SEWER EXTRA STRENGTH VITRIFIED CLAY PIPE & MANHOLE
- OIL — PROPOSED PETROL INTERCEPTOR
- PNT — PRIMARY NEUTRALISATION TANK TO BS8007
- Rg — PROPOSED ROAD GULLY
- Drg — PROPOSED DOUBLE ROAD GULLY
- ACO — PROPOSED ACO CHANNEL
- FOUL WATER CONNECTIONS TO BE TRAPPED
- BACK DROP

INTERNAL PLANT PROCESSDRAINAGE

- 300Ø (FP-B) — CHEMFLOW (FP-B) BEIGE GREY POLYPROPYLENE PIPE WITH 6 BAR RATING & THERMOFUSION JOINTS
- CP1 — CATCHPIT MANHOLE, DOUBLE SEALED & LOCKED
- 225Ø ESVC — PROPOSED FOUL WATER, EXTRA STRENGTH VITRIFIED CLAY PIPE
- ACO — ACO CHANNEL - S200, CLASS E
- INTERNAL GULLY WITH STAINLESS STEEL CATCHMENT BASKET

Key to symbols

- S2 FLOOD VOLUME=0.0m3 — MANHOLE REFERENCE, LOCATION & FLOODING VOLUME FOR A 1 IN 100 YEAR + 20% STORM EVENT
- FLOOD ROUTE PATH FOR SURFACE WATER FLOOD VOLUMES

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	05.08.10	D.M.S.	VARIOUS DRAINAGE CHANGES DUE TO LAYOUT REF: 256150/CAR/001-P2.	B.S.	F.T.
P1	07.10.09	M.F.	CLIENT DETAILS AMMENDED.	T.C.	S.T.T.

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Client
NEW EARTH
BIOSSENCE LTD
HOOTEN PARK E.F.W.

Title
NORTH ROAD RECYCLING PLANT
HOOTON PARK - EASTHAM
PROPOSED DRAINAGE LAYOUT
& FLOOD ROUTING PLAN FOR A
1 IN 100 Year+20% @ 37 l/sec MAX

Designed	DMS	Eng.Chk.	
Drawn	LS	Coordination	ST
Dwg.Chk.	BS	Approved	FT
Scale at A0 1:500	Project 258633	CAD file	Status PRE
Drawing No HP-258633-SL-001			Rev P2

ENC 7

creating a better place

Environment Agency

Mott MacDonald
To	A	I	C	Sign	Date
ST					18/01.

07 DEC 2009

File No 258633

Mott Macdonald Group
Spring Bank House
33 Stamford Street
Altrincham
Cheshire
WA14 1ES

Our ref: SO/2009/106241/01-L01
Your ref: RJM/NDS/STT/258633

Date: 03 December 2009

FAO S T Tyrer

Dear Sir

AGREEMENT OF DISCHARGE RATES FOR POSSIBLE VARIATION OF PLANNING CONDITION OPW13892
NORTH ROAD EASTHAM, WIRRAL

Thank you for your letter received in this office 12th November 2009.

We broadly agree with the contents of the correspondence and would confirm that the allowable discharge from the development must not exceed 37.1 litres/second for the total site area.

This request should be formally applied to Wirral Borough Council (WBC) who are the deciding Authority in this matter. Should WBC consult us on this matter we would likely advise that we have no objection to the re-wording of the planning condition, but advise that surface water discharges to the Manchester Ship Canal must not exceed 37.1 litres/second. Copies of all correspondence should be provided in support of any variation applied for.

The detailed drainage design must ensure that there is sufficient capacity within the drainage system, and/or within the site layout, to attenuate surface water volumes associated with events with return periods of up to and including the 1 in 100 year event (including an appropriate allowance for climate change) without posing a flood risk to proposed buildings and any surrounding the development. We will expect the drainage design to be supported by detailed calculations to demonstrate how the system will respond to events with return periods of up to and including the 1 in 100 year event (including allowance for climate change).

Paragraph F9 of Planning Policy Statement 25: Development & Flood Risk states that "site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts". This will need to be addressed at the detailed design stage.

Environment Agency
Appleton House (430) Birchwood Boulevard, Birchwood, Warrington, WA3 7WD.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Cont/d..

INVESTOR IN PEOPLE

I trust you find this information useful. Please do not hesitate to contact us should you have any further questions regarding this enquiry.

Yours faithfully

Mr Stephen Sayce
Planning Liaison Officer

Direct dial 01925 543361
Direct e-mail stephen.sayce@environment-agency.gov.uk

Our ref RJM/NDS/STT/258633
T 0161 926 4001
E Stephen.tyrer@mottmac.com
Your ref

Mott MacDonald

Mr R Knowles
Development and Flood Risk Officer
Environment Agency
Appleton House
430 Birchwood Boulevard
Warrington WA3 7WD

Mott MacDonald
Date
11 NOV 2009
258633

11 November 2009

Dear Mr Knowles

North Road Eastham 103798 – Agreement of Discharge Rates for Possible Variation of Planning Condition OPW13892

Further to our earlier telephone conversation, I am writing to confirm our previous agreements with your office that the maximum allowable surface water discharge from the above site must not exceed, 37.1L/Sec.

I also enclose a copy of the e-mail correspondence between Jo Green (EA) and Bob Smith (MM) on this matter for your information.

I trust you agree that we have interpreted all discussions correctly.

Yours sincerely
for Mott MacDonald Limited

S T Tyrer
Divisional Director

THE SUNDAY TIMES 20 BEST BIG COMPANIES TO WORK FOR 2009

Tyrer, Stephen T

From: Smith, Robert M
Sent: 04 June 2009 09:26
To: Tyrer, Stephen T
Subject: FW: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Steve

FYI

Bob

Mott MacDonald
Spring Bank House
33 Stamford Street
Altrincham
Cheshire
WA14 1ES

Tel: 0161 926 4189
Fax: 0161 926 4103

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Voted in the Top 20 of the Best Big Companies to work for 2008 by The Sunday Times

---

From: Green, Jo [mailto:jo.green@environment-agency.gov.uk]
Sent: 21 May 2009 08:57
To: Smith, Robert M
Subject: RE: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Bob,
No problem at all.
Keep me posted.
Regards,
Jo

Jo Green
Development & Flood Risk Officer
Environment Agency
Appleton House
430 Birchwood Boulevard
Warrington
WA3 7WD

Direct Line: 01925 251842

From: Smith, Robert M [mailto:robert.m.smith@mottmac.com]
Sent: 21 May 2009 08:40
To: Green, Jo
Cc: Sayce, Stephen; Mike.Partridge@shipcanal.co.uk; Tyrer, Stephen T; McNairn, Cameron

Subject: RE: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Jo

Thanks for the time and effort you have put into this !!

Now fully understand EA requirements.

Will design below ground drainage for development at Hooton Park, Eastham to restrict discharges from the site to a max of 37.1 l/sec

Regards

Bob

Mott MacDonald
Spring Bank House
33 Stamford Street
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WA14 1ES

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Fax: 0161 926 4103

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---

From: Green, Jo [mailto:jo.green@environment-agency.gov.uk]
Sent: 20 May 2009 16:00
To: Smith, Robert M
Cc: Sayce, Stephen; Mike.Partridge@shipcanal.co.uk; Tyrer, Stephen T; McNairn, Cameron
Subject: RE: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Bob,

I've talked this through with our Technical Specialist and I hope this will make things clearer

I've had a look at the CIRIA SuDS Manual (p 3-7) which talks about Storage Options for Volumetric Run-off Control. This states that, "It is possible that long-term storage or additional infiltration cannot be provided at certain sites. In these situations it is recommended that the **maximum discharge rate for the attenuation storage is reduced to the region of Qbar or 2l/s/ha whichever is the greater.**"

For this site, the Qbar rate is greater, therefore the final run-off from the site should be restricted to this. In accordance with Sewers for Adoption, the volumes up to the 1 in 30 year run-off rate can be stored within the drainage network, volumes up to the 1 in 100 year run-off rate can be stored above ground, on site. In any case, the final run-off rate from the site MUST NOT EXCEED 37.1 l/sec. Higher run-off rates are not acceptable because, for example if the run-off is restricted to 67.8 l/sec (1 in 30 year greenfield rate) this could result in considerably higher flows leaving the site at lower return periods ie equivalent to existing 1 in 30 year rates in a 1 in 2 year storm.

If this is still unclear I suggest that we arrange a meeting at this office to discuss.

Regards,
Jo

Jo Green
Development & Flood Risk Officer
Environment Agency
Appleton House
430 Birchwood Boulevard
Warrington
WA3 7WD

Direct Line: 01925 251842

From: Smith, Robert M [mailto:robert.m.smith@mottmac.com]
Sent: 19 May 2009 09:23
To: Green, Jo
Cc: Sayce, Stephen; Mike.Partridge@shipcanal.co.uk; Tyrer, Stephen T; McNairn, Cameron
Subject: RE: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Jo

Thank you for your previous advice clarifying the Environment Agency requirements in relation to greenfield runoff from the proposed development site at Hooton Park, Eastham.

Sorry to pursue this issue, however:

Section 5.50 of PPS 25 Practice Guide advises that "For the range of annual flow rate probabilities up to and including the one per cent annual exceedence probability (1 in 100 year) event, including an appropriate allowance for climate change, the developed rate of run-off into a watercourse, or other receiving water body, should be no greater than the existing rate of run-off for the same event."

Our interpretation of this is that the greenfield runoff from development site will vary depending on the return period of the rainfall event.

In the case of the Hooton Park, Eastham development this means therefore (refer to attached calculations) that greenfield runoff should be restricted to:

Rainfall event - 1 in 2 year Greenfield runoff - 37.1 l/sec

Rainfall event - 1 in 30 year Greenfield runoff - 67.8 l/sec

For rainfall events of greater than 1 in 30 year return period on site storage is to be provided to restrict runoff from the site. Greenfield runoff should therefore be restricted to 67.8 l/sec

We would argue that greenfield runoffs to be applied to the development site at Hooton Park, Eastham are as indicated above and that our design should ensure that both conditions are satisfied.

We would ask therefore that you reconsider your previous advice.

Regards

Bob

Mott MacDonald
Spring Bank House
33 Stamford Street
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WA14 1ES

Tel: 0161 926 4189
Fax: 0161 926 4103

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---

From: Green, Jo [mailto:jo.green@environment-agency.gov.uk]
Sent: 15 May 2009 11:55
To: Smith, Robert M
Cc: Sayce, Stephen; Mike.Partridge@shipcanal.co.uk; Tyrer, Stephen T; McNairn, Cameron
Subject: RE: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Bob,
I hope the following will make this clearer.

Working on the basis of your calculations:
The greenfield runoff rate (1 in 2 year return period) and therefore the allowable discharge rate for the development is 37.1 l/s.
For flows above the greenfield rate (37.1l/s) and up to the 1 in 30 return period (i.e 67.8l/s) there should be no above ground flooding.
Flows above the 1 in 30 return period but up to the 1 in 100 return period plus climate change must be i.e. 99.5l/s should be stored within the site.
If this still isn't clear, then I suggest we arrange a meeting to discuss and I will ask our Technical Specialist to come along.

Regards,
Jo

From: Smith, Robert M [mailto:robert.m.smith@mottmac.com]
Sent: 12 May 2009 15:32
To: Green, Jo
Cc: Sayce, Stephen; Mike.Partridge@shipcanal.co.uk; Tyrer, Stephen T; McNairn, Cameron
Subject: RE: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Click here to report this email as spam.

Jo

Thanks for your prompt respose to my query re discharge to Manc Ship Canal from proposed development site at Hooton the contents of which are noted.

We would confirm that our design will comply with your requirements as set out in your section on **Design Return Period.** Similarly, we have given consideration to overland flowpaths in the event of exceedance of the designed rainfall return periods

With regard to Allowable Discharge Rate for the development we accept that this should be in accordance with the provisions of PPS 25.
The objective of PPS 25 in relation to managing surface water is outlined in Annex F of PPS 25 and requires that surface water arising from the developed site should not threaten the development itself or increase the risk of flooding to others . This is to be acheived by managing surface waters arising from a developed site, as far as practicable, in a sustainable manner to mimic flows arising from the site prior to the proposed development. Additionally, Section 5.50 of PPS 25 Practice Guide advises that "For the range of annual flow

rate probabilities up to and including the one per cent annual exceedence probability (1 in 100 year) event, including an appropriate allowance for climate change, the developed rate of run-off into a watercourse, or other receiving water body, should be no greater than the existing rate of run-off for the same event." This guidance is repeated in item 8. Discharge rate criteria of joint Defra/Environment Agency document 'Preliminary Rainfall Runoff Management For Developments'

Additional information

Table 9.1 of joint Defra/Environment Agency document 'Preliminary Rainfall Runoff Management For Developments' recommends that "The Institute of Hydrology Report 124 Flood Estimation for Small Catchments (1994) is to be used to determine peak green field run-off rate." and " FSSR 2 and 14 regional growth factors are to be used to calculate the greenfield peak flow rates for 1, 30 and 100 year return periods."
Greenfield runoff from the proposed development site is dependant upon, and has been evaluated for, a range of return periods in accordance with IH 124 and the calculations attached for your consideration.

The submitted Flood Risk Assessment for the Energy-from Waste facility to be located at Hooton Park, Eastham concludes that "The proposed development site site lies in flood zone 1, meaning that the risk of fluvial or tidal flooding is very low." and "The Hooton Park site is not under threat from fluvial or tidal flooding, even taking account of a worst case scenario climate change projection, taking account of both a potential sea level rise and higher energy weather systems."
Surface water runoffs from the development site discharge to the Manchester Ship Canal. Water levels in this waterway are strictly controlled with sluices and lock gates discharging the the Mersey Estuary and therefore discharges to this watercourse will not increase the risk of flooding to others.

Previous discussions and correspondence with the Manchester Ship Canal Company (copy attached) indicates that, whilst there is no standard design for discharges to the waterway, the primary concern of MSCC with regard to discharges is that they must not interfere with passage of vessels. To this end the outfall to the canal must include for dissipation of the energy and be restricted to a maximum velocity in the range 1.5 to 3.0 m/sec (with a target of 2.0 m/sec) for the 1 in 30 year event. Regarding flow rate for discharges to the canal the only requirement is that there should be Environment Agency consent.

Our interpretation of all of the above, including the requirements of PPS 25 and advice in your Section on Design Return Period, is that discharges from the development site should be restricted to a peak flowate equivalent to 1 in 30 year greenfield runoff (ie 67.8 l/sec) with storage provided on site to accommodate runoffs up and including the 1 in 100 year plus climate change rainfall event an consideration given to flowpaths for flows generated by rainfall events in excess of these events. Additionally, the outfall structure must include an energy dissipation facility with velocity restricted to 2.0m/sec.

Please confirm that our interpretation of your requirements in relation to the proposed development site is correct.
Should you wish to discuss in greater detail then we are more than willing to visit your offices to discuss further.

Regards

Bob

Mott MacDonald
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WA14 1ES

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Fax: 0161 926 4103

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---

From: Green, Jo [mailto:jo.green@environment-agency.gov.uk]
Sent: 11 May 2009 07:59
To: Smith, Robert M
Cc: Sayce, Stephen
Subject: North Road Eastham 103798 Follow On Possible Variation of Planning Condition OPW13892

Bob,

Thanks for your call. I have copied Stephen Sayce, our Planning Liaison Officer in so that he can forward this on to Wirral BC as it relates to a possible change of planning condition.

Following our discussion regarding your proposal to vary the planning condition on the Biossence Planning Consent, I can confirm the following:-

Allowable Discharge Rate
In line with PPS25, the volumes and rates of runoff should be no greater than rates prior to the development. Therefore, the allowable discharge rate for this site will be restricted to the 1 in 2yr Greenfield Runoff Rate for rainfall events up to and including the 1 in 100 year plus appropriate climate change event.

Volumes of runoff should also be reduced wherever possible using infiltration and attenuation techniques.

Consultation with Manchester Ship Canal
The eventual discharge point from the Biossence site is into the Manchester Ship Canal. In any submission that you make, I will expect to see that you have consulted and agreed with Manchester Ship Canal that the allowable discharge rate proposed results in a limiting velocity which complies with their safety requirements for shipping.

Design Return Period
I confirm this will be the 1 in 2 year event with no above ground flooding for events with a 1 in 30 year return period.
Flows beyond the 1 in 30 year and up to the 1 in 100 plus appropriate climate change allowance should be stored in site.
No flooding of property should occur in the 1 in 100 year plus appropriate climate change event.

Event Exceedence
Designing for exceedence will need to be considered in line with PPS25 Practice Guide 5.47.

If we need to meet up to discuss this please let me know.

Regards,

Jo

Jo Green
Development & Flood Risk Officer
Environment Agency
Appleton House
430 Birchwood Boulevard
Warrington
WA3 7WD

Direct Line: 01925 251842

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ENC 8

PEEL PORTS GROUP

The Manchester Ship Canal Company
Head Office: Engineering Workshops, Runcorn Docks, Percival Lane,
Runcorn, Cheshire WA7 4UY

Tel: 01928 508550 Fax: 01928 567469
Website: www.shipcanal.co.uk e-mail: mail@shipcanal.co.uk

Peel
PEEL PORTS

Mott MacDonald

To	A	I	C	Sign	Date

- 8 APR 2009

File No
Return to

FAX

TO: Bob Smith.

FROM: Mike Partridge

FAX NUMBER: 0161 926 4103.

DATE: 8th April 2009.

Number of Pages including this one: 2No.

SUBJECT: Discharges into the Manchester Ship Canal.

Please find attached a copy of outfall details.

Regards
Mike Partridge.

Manchester Ship Canal Company

Discharges into the Manchester Ship Canal

1. The canals normal water level downstream of (identify location) is (depends on location m AOD). The water level, under normal circumstances can vary by +or– 300mm. The higher level can be exceeded in storm conditions. Also, a major incident at the downstream locks may result in a rapid drawdown of the water level. The outfall level should be below the normal minimum canal water level of (depends on location m AOD).

2. The outfall into the canal must include for the dissipation of energy. There are no standard designs, each installation being approved separately with all calculations and drawings submitted to the Company for approval. The cost of this approval will be fully recoverable from the Developer.

3. The discharge at the outlet must not interfere with the passage of vessels. The calculations must show that the transverse velocity from the discharge pipe is acceptable to this Company. The maximum velocity should be in the range 1.5 to 3.0 m/s (with a target of 2.0 m/s) for the 1 in 30 year event.

4. Any pipe outlet through the canal wall, at or above water level, should be provided with a flap valve.

5. An interceptor is to be provided to prevent pollution of the canal. A sample point is to be provided for use by the Environmental Agency. This should not be located on MSCC land.

6. There should be Environment Agency consent for the outfall with regard to flow rates and measures to prevent pollution.

7. If the outfall is to pass through the existing canal wall the integrity of the Canal wall must be maintained. The Manchester Ship Canal Company will not be held responsible for the canal wall providing support to the drainage construction. The Company will hold developers liable for any damage that may occur as a result of the construction and/or operation of the drainage structure.

8. The temporary works and permanent works must include provision for this Company to have free, continuous, unencumbered vehicular access along the edge of the canal, for maintenance purposes.

9. All construction works near to the canal shall be done under this Company's safe system of work and the issue of a Permit to Work. A method statement and risk assessment for the construction of the outfall shall be submitted and agreed prior to the issuing of the Permit. A representative of the contractor shall attend the MSCC safety induction seminar prior to works stating.

10. The Harbour Master will require to be satisfied that the construction works do not impact on the safe passage of shipping along the canal. Once detailed method statements have been prepared the Harbour Master will need to agree the method of work.
Assistant Harbour Master – A Feast – Tel: 0151 327 1244

ENC 9 DOC 1

Calculation cover sheet

Mott MacDonald

No. of Sheets

Project Title	Hooton Park EFW	**Project No.**	258633	**File No.**	.8.3
Section	Site Drainage	**Subject**	Drainage Design	**Calc No.**	1
Project Manager	Steve Tyrer	**Design Phase:**	A Concept or preliminary ☐ B Analysis and Detailed design x☐ C Design verification ☐ D Other (specify) ☐		
Designer	RM Smith				

Computer Applications Used

Title	**Version/Date**
FEH CD Rom	1.0
Windes Microdrainage	W.11.3

Scopes of Checking for Manual and Computer Generated Calculations

Full check

Sheets Checked *	**Calculations by** Name	Signature	Date	**Checked By** Name	Signature	Date
1-	RM Smith	RM Smith	May 2009	D Staff	[signature]	May 2009

*If an Excel spreadsheet or other computer file has been checked and has not been attached, enter the name, date and full file path or PIMs location of the file that was checked. (PIMs nickname or shortlink from Properties – General could also be useful.)

a) Basic Design Information or Source and Reference:

hb-Architects Site Layout Plan R24-06-P2c
ExCAL Limited FLOOD RISK ASSESSMENT
Metropolitan Borough of Wirral Planning Conditions
Correspondence with Environment Agency and Manchester Ship Canal Company
Planning Policy Statement 25: Development and Flood Risk
Institute of Hydrology Report 124: Flood Estimation for Small Catchments

b) Identify documents/technical records where output will be used:

Proposed Drainage Layout HP-258633-SL-001

Approved by Project Manager	**Error!**	**Signature**	**Date**

Distribution
Original to project

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Project Hooton Park, Eastham.

Calculations for Greenfield Runoff from Development Site.

Mott MacDonald

Divn/Dept MUD/B11 JobNr/FileNr 258633/8.3

Calculated by RM Smith Date May 2009. Sheet Nr 1 of

Checked by DM Staff Date May 2009.

Total area of undeveloped site = 7.526 Ha.

Total effective impermeable area of developed site = 4.826 Ha.

In accordance with PPS25 Practice Guide (June 2008) Paragraph 5.50:-

Development site is less than 50 Ha. therefore evaluate peak greenfield runoff rates in accordance with Institute of Hydrology Report 124: Flood Estimation for Small Catchments (1994).

$$QBAR_{RURAL} = 0.00108 . AREA^{0.89} . SAAR^{1.17} . SOIL^{2.17}$$

where $QBAR_{RURAL}$ = Mean Annual Flood for Catchment

AREA = Development Size (for dev size = 0.50 Ha, use $0.5 Km^2$ (50 Ha) and extrapolate)

SAAR = Standard Average Annual Rainfall (FEH CD-ROM) = 758 mm

SOIL = Soil Index taken from Maps in FSR. = 0.47

In this instance, mean annual rainfall is:

$$QBAR_{RURAL} = (0.00108 \times 0.5^{0.89} \times 758^{1.17} \times 0.47^{2.17})$$

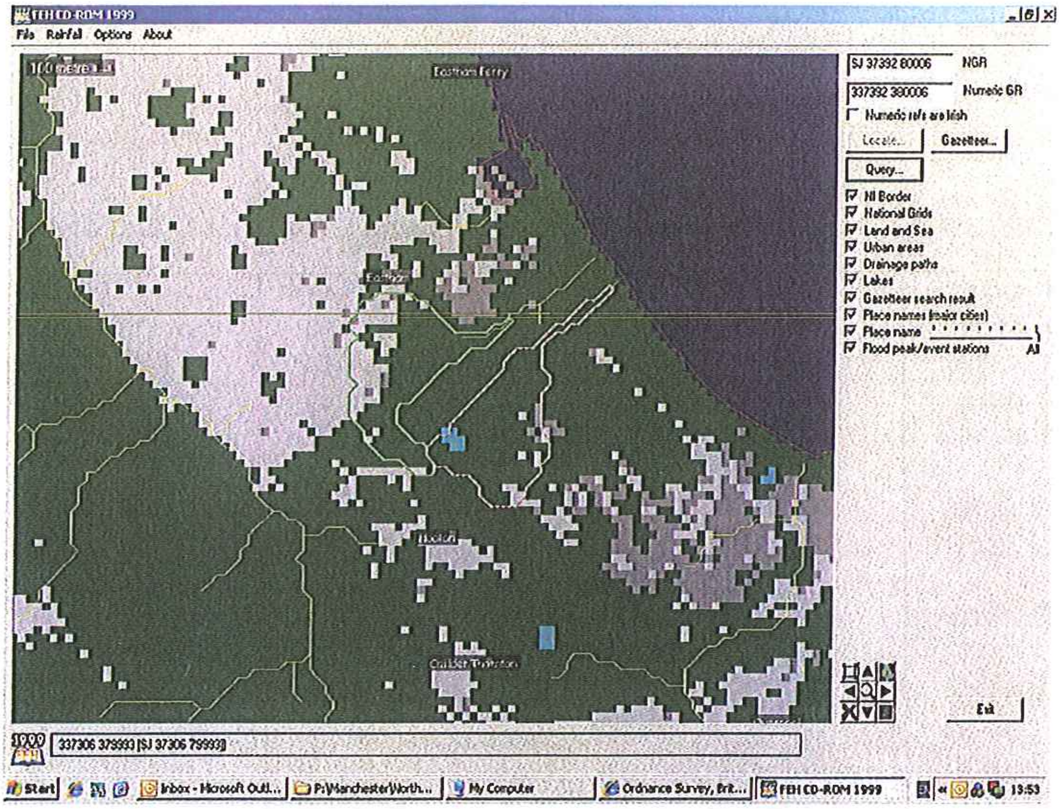
$= 0.265\ m^3/sec$ (50 Ha site) $\times 20 . \left(\frac{1000}{50}\right)$

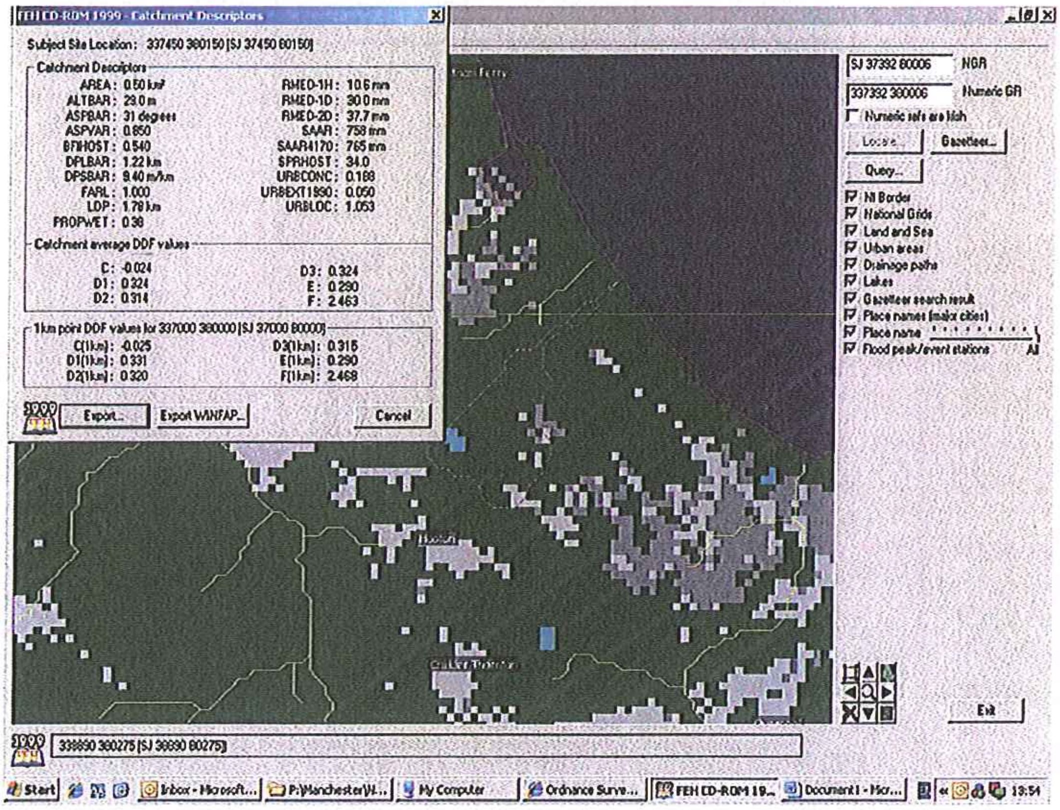
$= 5.299\ l/sec/Ha$.

Development site = 7.526 Ha and applying Regional Growth factors for Area 10 (S.H. Report 5).

Q (1 in 2 year) = 5.299 × 7.526 × 0.93	=	37.1 l/sec.
Q (1 in 30 year) = 5.299 × 7.526 × 1.70	=	67.8 l/sec.
Q (1 in 100 year) = 5.299 × 7.526 × 2.08	=	83.0 l/sec.
Q (1 in 100 year + 20%) = 83.0 × 1.2	=	99.5 l/sec.

FEH - Results


FEH CD-ROM 1999
File Rainfall Options About
SJ 37392 80006 NGR
337392 380006 Numeric GR
Numeric refs are Irish
Locate... Gazetteer...
Query...
NI Border
National Grids
Land and Sea
Urban areas
Drainage paths
Lakes
Gazetteer search result
Place names (major cities)
Place name
Flood peak/event stations
All
Exit
337306 379993 [SJ 37306 79993]
Start
Inbox - Microsoft Outl...
P:\Manchester\North...
My Computer
Ordnance Survey, Brit...
FEH CD-ROM 1999
13:53


FEH CD-ROM 1999 - Catchment Descriptors
Subject Site Location: 337450 380150 [SJ 37450 80150]
Catchment Descriptors
AREA: 0.50 km²
ALTBAR: 29.0 m
ASPBAR: 31 degrees
ASPVAR: 0.850
BFIHOST: 0.540
DPLBAR: 1.22 km
DPSBAR: 9.40 m/km
FARL: 1.000
LDP: 1.78 km
PROPWET: 0.38
RMED-1H: 10.6 mm
RMED-1D: 30.0 mm
RMED-2D: 37.7 mm
SAAR: 758 mm
SAAR4170: 765 mm
SPRHOST: 34.0
URBCONC: 0.188
URBEXT1990: 0.050
URBLOC: 1.053
Catchment average DDF values
C: -0.024
D1: 0.324
D2: 0.314
D3: 0.324
E: 0.290
F: 2.463
1km point DDF values for 337000 380000 [SJ 37000 80000]
C(1km): -0.025
D1(1km): 0.331
D2(1km): 0.320
D3(1km): 0.316
E(1km): 0.290
F(1km): 2.468
Export... Export WINFAP... Cancel
SJ 37392 80006 NGR
337392 380006 Numeric GR
Numeric refs are Irish
Locate... Gazetteer...
Query...
NI Border
National Grids
Land and Sea
Urban areas
Drainage paths
Lakes
Gazetteer search result
Place names (major cities)
Place name
Flood peak/event stations
All
Exit
338890 380275 [SJ 38890 80275]
Start
Inbox - Microsoft...
My Computer
FEH CD-ROM 19...
Document1 - Micr...
13:54

Project	NORTH ROAD HOOTON PARK EASTHAM

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Calculations for	Divn/Dept	JobNr/FileNr 256150/	
DRAINAGE AREAS.	Calculated by DMS.	Date 26/2/2009	Sheet Nr 1
	Checked by RMSmith	Date March 2009	of 2.

Pipe Ref:	Imp Areas	30%	Total	LENGTH
1.000	0.149 ✓	–	0.149 ✓	90
1.001	0.140 ✓	–	0.140 ✓	90
1.002	0.187 ✓	–	0.187 ✓	90
1.003	0.041 ✓	–	0.041 ✓	26
1.004	0.046 ✓	0.012	0.058 ✓	45
2.000	0.212 ✓	0.043	0.255 ✓	41
2.001	0.243 ✓	0.008	0.251 ✓	72
3.000	0.127 ✓	–	0.127 ✓	35
2.002	0.105 ✓	–	0.105	35
4.000	0.012 ✓	–	0.012 ✓	16
4.001	0.043 ✓	–	0.043 ✓	14
2.003	0.099 ✓	–	0.099 ✓	35
2.004	Carrier ✓	-	Carrier	10 ✓
1.005	0.047 ✓	0.040	0.087	44 ✓
1.006	0.161 ✓	0.016	0.177	83 ✓
5.000	0.292 ✓	0.012	0.304	55 ✓
5.001	Carrier ✓	0.057	0.057	17 ✓
5.002	0.038 ✓	0.043	0.081	35 ✓
5.003	0.072 ✓	0.010	0.082	82 ✓
5.004	0.040 ✓	0.006	0.046	54 ✓
5.005	0.019 ✓	0.003	0.021	33 ✓
5.006	0.020 ✓	0.003	0.023	13.5 ✓
6.000	0.071 ✓	0.045	0.116	90 ✓
5.007	0.027 ✓	0.013	0.040	22 ✓
1.007	Carrier ✓	0.099	0.099	OIL INTERCEPTOR 25 ✓
7.000	0.105 ✓	–	0.105	74 ✓
7.001	0.012 ✓	–	0.012	36 ✓
8.000	0.072 ✓	–	0.072	36 ✓
8.001	0.030 ✓	–	0.030	44 ✓
7.002	Carrier ✓	–	Carrier	32 ✓
9.000	0.088 ✓	–	0.088	38 ✓
9.001	Carrier ✓	–	Carrier	38 ✓

Project NORTH ROAD HOOTON PARK EASTHAM

Mott MacDonald

Calculations for	Divn/Dept	JobNr/FileNr 256150.	
DRAINAGE AREAS	Calculated by DMS	Date 26/2/2009	Sheet Nr 2.
	Checked by RM Smith	Date March 2009.	of 2.

Pipe Ref:	Imp Area	30%	Total	Length
7.003	0.105 ✓	–	0.105	50 ✓
7.004	0.191 ✓	–	0.191	45 ✓
7.005	0.134 ✓	–	0.134	45 ✓
7.006	0.086 ✓	–	0.086	38 ✓
7.007	0.008 ✓	–	0.008	13 ✓
7.008	Carrier ✓	–	–	41 ✓
10.000	0.372 ✓	–	0.372	44 ✓
10.001	0.373 ✓	–	0.373	46 ✓
10.002	0.509 ✓	–	0.509	50 ✓
10.003	Carrier ✓	–	Carrier	14 ✓
10.004	0.023 ✓	–	0.023	23. ✓
10.005.	0.049 ✓	–	0.049	39 ✓
10.006	0.069 ✓	–	0.069.	47 ✓
10.007	Carrier	–	Carrier	38
1.008	Carrier	–	Carrier	24. INTO POND.
			4.826 ha	TOTAL EFFECTIVE SITE IMP AREA

∴ FROM QBAR SHEET

5.519 EFF AREA – 4.826 EFF AREA = 0.693 IMP AREA DESIGNATED TO THE WOODLAND AREA.

ENC 9 DOC 2

Mott MacDonald Ltd		Page 1
Spring Bank House 33 Stamford Street Altrincham WA14 1ES	North Rd Recycling Plant Hooton Park-Eastham 1 in 30 Year-37L/s	Micro Drainage®
Date 4th August 2010 File DS-Hooton Park-37Ls-1i...	Designed By DMS Checked By	
Micro Drainage	Simulation W.11.4	

Global Variables

Region	FEH Rainfall Model
Return Period (yrs)	30
Site Location	(Unknown)
C(1km)	-0.025
D1(1km)	0.331
D2(1km)	0.320
D3(1km)	0.315
E(1km)	0.290
F(1km)	2.468
Volumetric Runoff Coef	0.900
Profile Type	Summer
PIMP (%)	100
Areal Reduction Factor	1.000
Storm Duration (mins)	15
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coefficient	0.500
MADD Factor * 10m³/ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	0
Inlet Coefficient	0.800
Number of Input Hydrographs	0
Number of Time/Area Diagrams	0
Number of Bifurcations	0
Number of Overflows	1
Number of Off-Line Controls	0
Number of On-Line Controls	1

Starting Storm file name

P:\Manchester\Northwest\Projects (Even)\256150_Hooton_New_Earth\11.0 Tech Notes and Calcs\Microdrainage\Hooton Park-Eastham 37Ls-1in2year.sws

Overflows

DS/PN	Max Pipe Flow (l/s)
1.009	37.0

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.013		9.371	8.263	1200	0

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On-Line Controls (Hydro-Brake®)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Type	Dia (m)	D.Head (m)	D.Flow (l/s)	Headloss (m)	Flow (l/s)
1.009	0.117	HYD	9.565	Md10	0.146	1.550	37.1	0.2	10.5
								0.4	18.8
								0.6	23.1
								0.8	26.6
								1.0	29.8
								1.4	35.2
								1.8	39.9
								2.2	44.2
								2.6	48.0
								3.0	51.6
								3.4	54.9
								3.8	58.0
								4.2	61.0
								4.6	63.9
								5.0	66.6

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Storage Pond at pipe 1.009 USMH POND

Storage Pond Invert Level (m) 9.615

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.0	4.5	1.2	4.5	2.4	119.0	3.6	257.0	4.8	129.0
0.2	4.5	1.4	4.5	2.6	139.0	3.8	285.0	5.0	129.0
0.4	4.5	1.6	4.5	2.8	160.0	4.0	314.0		
0.6	4.5	1.8	4.5	3.0	182.0	4.2	344.0		
0.8	4.5	2.0	83.0	3.2	206.0	4.4	375.0		
1.0	4.5	2.2	100.0	3.4	231.0	4.6	391.0		

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Network Details

* - Indicates pipe has been modified outside of WinDes's Storm/Foul & Schedules

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
1.000	90.00	1.200	75.0	0.149	3.00	1	0.600	o	225
1.001	90.00	0.600	150.0	0.140	0.00	1	0.600	o	300
1.002	90.00	0.325	276.9	0.187	0.00	1	0.600	o	375
1.003	26.00	0.400	65.0	0.041	0.00	1	0.600	o	375
1.004	45.00	1.517	29.7	0.058	0.00	1	0.600	o	375
2.000	41.00	0.953	43.0	0.255	3.00	1	0.600	o	300
2.001	72.00	0.244	295.1	0.251	0.00	1	0.600	o	525
3.000	35.00	1.622	21.6	0.127	3.00	1	0.600	o	225
2.002	35.00	0.116	301.7	0.105	0.00	1	0.600	o	525
4.000	16.00	0.400	40.0	0.012	3.00	1	0.600	o	150
4.001	14.00	1.763	7.9	0.043	0.00	1	0.600	o	150
2.003	35.00	0.098	357.1	0.099	0.00	1	0.600	o	600
2.004	10.00	0.031	322.6	0.000	0.00	1	0.600	o	600
1.005	44.00	0.400	110.0	0.087	0.00	1	0.600	o	600
1.006	83.00	2.428	34.2	0.177	0.00	1	0.600	o	600
5.000	55.00	0.275	200.0	0.304	3.00	1	0.600	o	375
5.001	17.00	0.050	340.0	0.057	0.00	1	0.600	o	375

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
1.000	S1	19.750	18.250	1.275	18.700	17.050	1.425		1200
1.001	S2	18.700	16.975	1.425	18.100	16.375	1.425		1350
1.002	S3	18.100	16.300	1.425	17.700	15.975	1.350		1350
1.003	S4	17.700	15.900	1.425	17.300	15.500	1.425		1500
1.004	S5	17.300	15.500	1.425	16.300	13.983	1.942		1500
2.000	S6	17.160	15.500	1.360	16.150	14.547	1.303		1350
2.001	S7	16.150	14.322	1.303	16.200	14.078	1.597		1800
3.000	S8	17.500	16.000	1.275	16.200	14.378	1.597		1200
2.002	S9	16.200	14.078	1.597	16.300	13.962	1.813		1800
4.000	S10	17.000	15.500	1.350	16.600	15.100	1.350		1200
4.001	S11	16.600	15.100	1.350	16.300	13.337	2.813		1200
2.003	S12	16.300	13.887	1.813	16.200	13.789	1.811		2100
2.004	S13	16.200	13.789	1.811	16.300	13.758	1.942		2100
1.005	S14	16.300	13.758	1.942	15.250	13.358	1.292		2100
1.006	S15	15.250	13.358	1.292	14.250	10.930	2.720		2100
5.000	S16	14.800	13.150	1.275	14.650	12.875	1.400		1500
5.001	S17	14.650	12.875	1.400	14.400	12.825	1.200		1800

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Network Details

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
5.002	35.00	0.400	87.5	0.081	0.00	1	0.600	o	450
5.003	82.00	0.525	156.2	0.083	0.00	1	0.600	o	450
5.004	54.00	0.180	300.0	0.046	0.00	1	0.600	o	450
5.005	33.00	0.110	300.0	0.021	0.00	1	0.600	o	450
5.006	13.50	0.305	44.3	0.023	0.00	1	0.600	o	450
6.000	90.00	0.600	150.0	0.116	3.00	1	0.600	o	300
5.007	22.00	0.150	146.7	0.040	0.00	1	0.600	o	525
1.007	25.00	0.967	25.9	0.099	0.00	1	0.600	o	750
7.000	74.00	0.617	119.9	0.105	3.00	1	0.600	o	225
7.001	36.00	0.300	120.0	0.012	0.00	1	0.600	o	225
8.000	36.00	0.300	120.0	0.072	3.00	1	0.600	o	225
8.001	44.00	0.767	57.4	0.030	0.00	1	0.600	o	225
7.002	32.00	0.163	196.3	0.000	0.00	1	0.600	o	300
9.000	38.00	0.317	119.9	0.088	3.00	1	0.600	o	225
9.001	38.00	1.113	34.1	0.000	0.00	1	0.600	o	225
7.003	50.00	0.197	253.8	0.105	0.00	1	0.600	o	375
7.004	45.00	0.150	300.0	0.191	0.00	1	0.600	o	450

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
5.002	S18	14.400	12.750	1.200	14.000	12.350	1.200		1800
5.003	S19	14.000	12.350	1.200	13.550	11.825	1.275		1500
5.004	S20	13.550	11.825	1.275	13.950	11.645	1.855		1500
5.005	S21	13.950	11.645	1.855	13.900	11.535	1.915		1500
5.006	S22	13.900	11.535	1.915	13.850	11.230	2.170		1800
6.000	S23	13.400	11.980	1.120	13.850	11.380	2.170		1350
5.007	S24	13.850	11.155	2.170	14.250	11.005	2.720		2100
1.007	S25	14.250	10.780	2.720	14.100	9.813	3.537		2100
7.000	S26	14.600	12.950	1.425	14.600	12.333	2.042		1200
7.001	S27	14.600	12.333	2.042	13.850	12.033	1.592		1500
8.000	S28	14.750	13.100	1.425	14.800	12.800	1.775		1200
8.001	S29	14.800	12.800	1.775	13.850	12.033	1.592		1200
7.002	S30	13.850	11.958	1.592	14.100	11.795	2.005		1500
9.000	S31	14.950	13.300	1.425	14.950	12.983	1.742		1200
9.001	S32	14.950	12.983	1.742	14.100	11.870	2.005		1200
7.003	S33	14.100	11.720	2.005	13.850	11.523	1.952		1800
7.004	S34	13.850	11.448	1.952	13.700	11.298	1.952		1500

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Network Details

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
7.005	45.00	0.150	300.0	0.134	0.00	1	0.600	o	450
7.006	38.00	0.127	299.2	0.086	0.00	1	0.600	o	450
7.007	13.00	0.871	14.9	0.008	0.00	1	0.600	o	450
7.008	41.00	0.037	1108.1	0.000	0.00	1	0.600	o	450
10.000	44.00	0.360	122.2	0.372	3.00	1	0.600	o	600
10.001	46.00	0.153	300.7	0.373	0.00	1	0.600	o	600
10.002	50.00	0.143	349.7	0.509	0.00	1	0.600	o	675
10.003	14.00	0.040	350.0	0.000	0.00	1	0.600	o	675
10.004	23.00	0.066	348.5	0.023	0.00	1	0.600	o	675
10.005	39.00	0.303	128.7	0.049	0.00	1	0.600	o	675
10.006	47.00	0.850	55.3	0.069	0.00	1	0.600	o	675
10.007	38.00	0.400	95.0	0.000	0.00	1	0.600	o	675
1.008	24.00	0.048	500.0	0.000	0.00	1	0.600	o	900
1.009	3.00	0.050	60.0	0.000	0.00	1	0.600	o	300
1.010	55.00	0.230	239.1	0.000	0.00	1	0.600	o	300
1.011	15.00	0.063	238.1	0.000	0.00	1	0.600	o	300
1.012	71.00	0.802	88.5	0.000	0.00	1	0.600	o	300
1.013	49.00	0.207	236.7	0.000	0.00	1	0.600	o	300

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
7.005	S35	13.700	11.298	1.952	13.850	11.148	2.252		1500
7.006	S36	13.850	11.148	2.252	13.950	11.021	2.479		1500
7.007	S37	13.950	11.021	2.479	14.000	10.150	3.400		1800
7.008	S38	14.000	10.150	3.400	14.100	10.113	3.537		1800
10.000	S39	16.000	14.340	1.060	16.000	13.980	1.420		1800
10.001	S40	16.000	13.980	1.420	15.950	13.827	1.523		1800
10.002	S41	15.950	13.752	1.523	15.950	13.609	1.666		2100
10.003	S42	15.950	13.609	1.666	16.200	13.569	1.956		2100
10.004	S43	16.200	13.569	1.956	15.950	13.503	1.772		2100
10.005	S44	15.950	13.503	1.772	15.200	13.200	1.325		2100
10.006	S45	15.200	13.200	1.325	14.350	12.350	1.325		2100
10.007	S46	14.350	12.350	1.325	14.100	11.950	1.475		2100
1.008	S47	14.100	9.663	3.537	14.100	9.615	3.585		2400
1.009	POND	14.100	9.615	4.185	14.000	9.565	4.135		1350
1.010	HYD	14.000	9.565	4.135	14.000	9.335	4.365	9	1350
1.011	S48	14.000	9.335	4.365	13.850	9.272	4.278		1200
1.012	S49	13.850	9.272	4.278	13.250	8.470	4.480		1200
1.013	S50	13.250	8.470	4.480	9.371	8.263	0.808		1200

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Summary Wizard of "CRITICAL"(Rank 1 by Max Level) Results for Design Storms

Margin for Flood Risk warning (mm)	300
DTS Status	ON
DVD Status	ON
Inertia Status	OFF
Analysis Time Step	Fine

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
1.000	15 Summer	30	0%	1	30/15 Summer			
1.001	15 Summer	30	0%	1	30/15 Summer			
1.002	15 Summer	30	0%	1	30/15 Summer			
1.003	15 Summer	30	0%	1				
1.004	15 Summer	30	0%	1				
2.000	15 Summer	30	0%	1				
2.001	15 Summer	30	0%	1	30/15 Summer			
3.000	15 Summer	30	0%	1				
2.002	15 Summer	30	0%	1	30/15 Summer			
4.000	15 Summer	30	0%	1				
4.001	15 Summer	30	0%	1				
2.003	15 Summer	30	0%	1	30/15 Summer			
2.004	15 Summer	30	0%	1	30/15 Summer			
1.005	15 Summer	30	0%	1				
1.006	15 Summer	30	0%	1				
5.000	15 Summer	30	0%	1	30/15 Summer			
5.001	15 Summer	30	0%	1	30/15 Summer			
5.002	15 Summer	30	0%	1				

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
	1.000	19.338	0.863	0.000	1.06	0.0	62.0	SURCH'ED
	1.001	18.033	0.758	0.000	1.22	0.0	106.6	SURCH'ED
	1.002	17.062	0.387	0.000	1.40	0.0	160.0	SURCH'ED
	1.003	16.151	-0.124	0.000	0.78	0.0	167.6	O K
	1.004	15.699	-0.176	0.000	0.54	0.0	181.1	O K
	2.000	15.737	-0.063	0.000	0.92	0.0	145.6	O K
	2.001	14.963	0.116	0.000	0.92	0.0	238.4	SURCH'ED
	3.000	16.142	-0.083	0.000	0.70	0.0	74.3	O K
	2.002	14.778	0.175	0.000	1.34	0.0	318.6	SURCH'ED
	4.000	15.553	-0.097	0.000	0.27	0.0	7.0	O K
	4.001	15.175	-0.075	0.000	0.50	0.0	28.9	O K
	2.003	14.599	0.112	0.000	1.18	0.0	356.7	SURCH'ED
	2.004	14.454	0.065	0.000	1.55	0.0	358.7	SURCH'ED
	1.005	14.237	-0.121	0.000	0.99	0.0	558.7	O K
	1.006	13.681	-0.277	0.000	0.55	0.0	595.4	O K
	5.000	13.814	0.289	0.000	1.20	0.0	157.4	SURCH'ED
	5.001	13.407	0.157	0.000	2.05	0.0	180.7	SURCH'ED
	5.002	13.035	-0.165	0.000	0.71	0.0	216.2	O K

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Summary Wizard of "CRITICAL"(Rank 1 by Max Level)
Results for Design Storms

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
5.003	15 Summer	30	0%	1	30/15 Summer			
5.004	15 Summer	30	0%	1	30/15 Summer			
5.005	15 Summer	30	0%	1	30/15 Summer			
5.006	15 Summer	30	0%	1				
6.000	15 Summer	30	0%	1				
5.007	120 Summer	30	0%	1	30/120 Summer			
1.007	120 Summer	30	0%	1	30/120 Summer			
7.000	15 Summer	30	0%	1	30/15 Summer			
7.001	15 Summer	30	0%	1	30/15 Summer			
8.000	15 Summer	30	0%	1				
8.001	15 Summer	30	0%	1	30/15 Summer			
7.002	15 Summer	30	0%	1	30/15 Summer			
9.000	15 Summer	30	0%	1	30/15 Summer			
9.001	15 Summer	30	0%	1				
7.003	15 Summer	30	0%	1	30/15 Summer			
7.004	15 Summer	30	0%	1	30/15 Summer			
7.005	15 Summer	30	0%	1	30/15 Summer			
7.006	15 Summer	30	0%	1	30/15 Summer			
7.007	120 Summer	30	0%	1	30/15 Summer			
7.008	960 Summer	30	0%	1	30/15 Summer			
10.000	15 Summer	30	0%	1				
10.001	15 Summer	30	0%	1	30/15 Summer			
10.002	15 Summer	30	0%	1	30/15 Summer			
10.003	15 Summer	30	0%	1	30/15 Summer			
10.004	15 Summer	30	0%	1	30/15 Summer			

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
	5.003	12.811	0.011	0.000	0.92	0.0	222.7	SURCH'ED
	5.004	12.415	0.140	0.000	1.22	0.0	206.9	SURCH'ED
	5.005	12.145	0.050	0.000	1.27	0.0	205.4	SURCH'ED
	5.006	11.806	-0.179	0.000	0.67	0.0	209.3	O K
	6.000	12.184	-0.096	0.000	0.74	0.0	64.4	O K
	5.007	11.724	0.044	0.000	0.41	0.0	121.1	SURCH'ED
	1.007	11.589	0.059	0.000	0.26	0.0	399.6	SURCH'ED
	7.000	13.507	0.332	0.000	1.09	0.0	50.3	SURCH'ED
	7.001	13.008	0.450	0.000	1.03	0.0	46.1	SURCH'ED
	8.000	13.276	-0.049	0.000	0.90	0.0	40.1	O K
	8.001	13.038	0.013	0.000	0.83	0.0	54.2	SURCH'ED
	7.002	12.807	0.549	0.000	1.13	0.0	81.7	SURCH'ED
	9.000	13.608	0.083	0.000	1.09	0.0	48.8	SURCH'ED
	9.001	13.105	-0.103	0.000	0.57	0.0	47.8	O K
	7.003	12.676	0.581	0.000	1.22	0.0	140.8	SURCH'ED
	7.004	12.389	0.491	0.000	1.21	0.0	203.0	SURCH'ED
	7.005	12.146	0.398	0.000	1.45	0.0	241.8	SURCH'ED
	7.006	11.796	0.198	0.000	1.56	0.0	256.8	SURCH'ED
	7.007	11.629	0.158	0.000	0.21	0.0	111.3	SURCH'ED
	7.008	11.464	0.864	0.000	0.38	0.0	30.8	SURCH'ED
	10.000	14.724	-0.216	0.000	0.39	0.0	207.8	O K
	10.001	14.652	0.072	0.000	0.98	0.0	335.4	SURCH'ED
	10.002	14.571	0.144	0.000	1.13	0.0	485.8	SURCH'ED
	10.003	14.396	0.112	0.000	1.52	0.0	468.8	SURCH'ED
	10.004	14.283	0.039	0.000	1.24	0.0	465.7	SURCH'ED

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Summary Wizard of "CRITICAL"(Rank 1 by Max Level) Results for Design Storms

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
10.005	15 Summer	30	0%	1				
10.006	15 Summer	30	0%	1				
10.007	15 Summer	30	0%	1				
1.008	960 Summer	30	0%	1	30/15 Summer			
1.009	960 Summer	30	0%	1	30/15 Summer			
1.010	960 Winter	30	0%	1	30/15 Summer			
1.011	960 Winter	30	0%	1				
1.012	960 Winter	30	0%	1				
1.013	960 Winter	30	0%	1				

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
	10.005	13.923	-0.255	0.000	0.70	0.0	477.2	O K
	10.006	13.519	-0.356	0.000	0.45	0.0	487.9	O K
	10.007	12.733	-0.292	0.000	0.60	0.0	480.4	O K
	1.008	11.463	0.900	0.000	0.29	0.0	178.4	SURCH'ED
	1.009	11.461	1.546	0.000	0.62	0.0	38.2	SURCH'ED
	1.010	12.544	2.679	0.000	0.55	0.0	37.3	SURCH'ED
	1.011	9.507	-0.128	0.000	0.62	0.0	37.3	O K
	1.012	9.391	-0.181	0.000	0.33	0.0	37.4	O K
	1.013	8.630	-0.140	0.000	0.55	0.0	37.4	O K

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Mott MacDonald Ltd		Page 1
Spring Bank House 33 Stamford Street Altrincham WA14 1ES	North Rd Recycling Plant Hooton Park-Eastham 1 in 100Year+20%-37L/s	Micro Drainage®
Date 4th August 2010 File DS-Hooton Park-37Ls-1i...	Designed By DMS Checked By	
Micro Drainage	Simulation W.11.4	

Global Variables

Region	FEH Rainfall Model
Return Period (yrs)	100
Site Location	(Unknown)
C(1km)	-0.025
D1(1km)	0.331
D2(1km)	0.320
D3(1km)	0.315
E(1km)	0.290
F(1km)	2.468
Volumetric Runoff Coef	0.900
Profile Type	Summer
PIMP (%)	100
Areal Reduction Factor	1.000
Storm Duration (mins)	15
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coefficient	0.500
MADD Factor * 10m³/ha Storage	2.000
Foul Sewage/Hectare (l/s)	0.00
Additional Flow - % of Total Flow	0
Inlet Coefficient	0.800
Number of Input Hydrographs	0
Number of Time/Area Diagrams	0
Number of Bifurcations	0
Number of Overflows	1
Number of Off-Line Controls	0
Number of On-Line Controls	1

Starting Storm file name

P:\Manchester\Northwest\Projects (Even)\256150_Hooton_New_Earth\11.0 Tech Notes and Calcs\Microdrainage\Hooton Park-Eastham 37Ls-1in2year.sws

Overflows

DS/PN	Max Pipe Flow (l/s)
1.009	37.0

Freely Discharging Outfalls

Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)
1.013		9.371	8.263	1200	0

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On-Line Controls (Hydro-Brake®)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Type	Dia (m)	D.Head (m)	D.Flow (l/s)	Headloss (m)	Flow (l/s)
1.009	0.117	HYD	9.565	Md10	0.146	1.550	37.1	0.2	10.5
								0.4	18.8
								0.6	23.1
								0.8	26.6
								1.0	29.8
								1.4	35.2
								1.8	39.9
								2.2	44.2
								2.6	48.0
								3.0	51.6
								3.4	54.9
								3.8	58.0
								4.2	61.0
								4.6	63.9
								5.0	66.6

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Storage Pond at pipe 1.009 USMH POND

Storage Pond Invert Level (m) 9.615

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.0	4.5	1.2	4.5	2.4	119.0	3.6	257.0	4.8	129.0
0.2	4.5	1.4	4.5	2.6	139.0	3.8	285.0	5.0	129.0
0.4	4.5	1.6	4.5	2.8	160.0	4.0	314.0		
0.6	4.5	1.8	4.5	3.0	182.0	4.2	344.0		
0.8	4.5	2.0	83.0	3.2	206.0	4.4	375.0		
1.0	4.5	2.2	100.0	3.4	231.0	4.6	391.0		

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Network Details

* - Indicates pipe has been modified outside of WinDes's Storm/Foul & Schedules

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
1.000	90.00	1.200	75.0	0.149	3.00	1	0.600	o	225
1.001	90.00	0.600	150.0	0.140	0.00	1	0.600	o	300
1.002	90.00	0.325	276.9	0.187	0.00	1	0.600	o	375
1.003	26.00	0.400	65.0	0.041	0.00	1	0.600	o	375
1.004	45.00	1.517	29.7	0.058	0.00	1	0.600	o	375
2.000	41.00	0.953	43.0	0.255	3.00	1	0.600	o	300
2.001	72.00	0.244	295.1	0.251	0.00	1	0.600	o	525
3.000	35.00	1.622	21.6	0.127	3.00	1	0.600	o	225
2.002	35.00	0.116	301.7	0.105	0.00	1	0.600	o	525
4.000	16.00	0.400	40.0	0.012	3.00	1	0.600	o	150
4.001	14.00	1.763	7.9	0.043	0.00	1	0.600	o	150
2.003	35.00	0.098	357.1	0.099	0.00	1	0.600	o	600
2.004	10.00	0.031	322.6	0.000	0.00	1	0.600	o	600
1.005	44.00	0.400	110.0	0.087	0.00	1	0.600	o	600
1.006	83.00	2.428	34.2	0.177	0.00	1	0.600	o	600
5.000	55.00	0.275	200.0	0.304	3.00	1	0.600	o	375
5.001	17.00	0.050	340.0	0.057	0.00	1	0.600	o	375

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
1.000	S1	19.750	18.250	1.275	18.700	17.050	1.425		1200
1.001	S2	18.700	16.975	1.425	18.100	16.375	1.425		1350
1.002	S3	18.100	16.300	1.425	17.700	15.975	1.350		1350
1.003	S4	17.700	15.900	1.425	17.300	15.500	1.425		1500
1.004	S5	17.300	15.500	1.425	16.300	13.983	1.942		1500
2.000	S6	17.160	15.500	1.360	16.150	14.547	1.303		1350
2.001	S7	16.150	14.322	1.303	16.200	14.078	1.597		1800
3.000	S8	17.500	16.000	1.275	16.200	14.378	1.597		1200
2.002	S9	16.200	14.078	1.597	16.300	13.962	1.813		1800
4.000	S10	17.000	15.500	1.350	16.600	15.100	1.350		1200
4.001	S11	16.600	15.100	1.350	16.300	13.337	2.813		1200
2.003	S12	16.300	13.887	1.813	16.200	13.789	1.811		2100
2.004	S13	16.200	13.789	1.811	16.300	13.758	1.942		2100
1.005	S14	16.300	13.758	1.942	15.250	13.358	1.292		2100
1.006	S15	15.250	13.358	1.292	14.250	10.930	2.720		2100
5.000	S16	14.800	13.150	1.275	14.650	12.875	1.400		1500
5.001	S17	14.650	12.875	1.400	14.400	12.825	1.200		1800

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Network Details

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
5.002	35.00	0.400	87.5	0.081	0.00	1	0.600	o	450
5.003	82.00	0.525	156.2	0.083	0.00	1	0.600	o	450
5.004	54.00	0.180	300.0	0.046	0.00	1	0.600	o	450
5.005	33.00	0.110	300.0	0.021	0.00	1	0.600	o	450
5.006	13.50	0.305	44.3	0.023	0.00	1	0.600	o	450
6.000	90.00	0.600	150.0	0.116	3.00	1	0.600	o	300
5.007	22.00	0.150	146.7	0.040	0.00	1	0.600	o	525
1.007	25.00	0.967	25.9	0.099	0.00	1	0.600	o	750
7.000	74.00	0.617	119.9	0.105	3.00	1	0.600	o	225
7.001	36.00	0.300	120.0	0.012	0.00	1	0.600	o	225
8.000	36.00	0.300	120.0	0.072	3.00	1	0.600	o	225
8.001	44.00	0.767	57.4	0.030	0.00	1	0.600	o	225
7.002	32.00	0.163	196.3	0.000	0.00	1	0.600	o	300
9.000	38.00	0.317	119.9	0.088	3.00	1	0.600	o	225
9.001	38.00	1.113	34.1	0.000	0.00	1	0.600	o	225
7.003	50.00	0.197	253.8	0.105	0.00	1	0.600	o	375
7.004	45.00	0.150	300.0	0.191	0.00	1	0.600	o	450

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
5.002	S18	14.400	12.750	1.200	14.000	12.350	1.200		1800
5.003	S19	14.000	12.350	1.200	13.550	11.825	1.275		1500
5.004	S20	13.550	11.825	1.275	13.950	11.645	1.855		1500
5.005	S21	13.950	11.645	1.855	13.900	11.535	1.915		1500
5.006	S22	13.900	11.535	1.915	13.850	11.230	2.170		1800
6.000	S23	13.400	11.980	1.120	13.850	11.380	2.170		1350
5.007	S24	13.850	11.155	2.170	14.250	11.005	2.720		2100
1.007	S25	14.250	10.780	2.720	14.100	9.813	3.537		2100
7.000	S26	14.600	12.950	1.425	14.600	12.333	2.042		1200
7.001	S27	14.600	12.333	2.042	13.850	12.033	1.592		1500
8.000	S28	14.750	13.100	1.425	14.800	12.800	1.775		1200
8.001	S29	14.800	12.800	1.775	13.850	12.033	1.592		1200
7.002	S30	13.850	11.958	1.592	14.100	11.795	2.005		1500
9.000	S31	14.950	13.300	1.425	14.950	12.983	1.742		1200
9.001	S32	14.950	12.983	1.742	14.100	11.870	2.005		1200
7.003	S33	14.100	11.720	2.005	13.850	11.523	1.952		1800
7.004	S34	13.850	11.448	1.952	13.700	11.298	1.952		1500

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Network Details

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
7.005	45.00	0.150	300.0	0.134	0.00	1	0.600	o	450
7.006	38.00	0.127	299.2	0.086	0.00	1	0.600	o	450
7.007	13.00	0.871	14.9	0.008	0.00	1	0.600	o	450
7.008	41.00	0.037	1108.1	0.000	0.00	1	0.600	o	450
10.000	44.00	0.360	122.2	0.372	3.00	1	0.600	o	600
10.001	46.00	0.153	300.7	0.373	0.00	1	0.600	o	600
10.002	50.00	0.143	349.7	0.509	0.00	1	0.600	o	675
10.003	14.00	0.040	350.0	0.000	0.00	1	0.600	o	675
10.004	23.00	0.066	348.5	0.023	0.00	1	0.600	o	675
10.005	39.00	0.303	128.7	0.049	0.00	1	0.600	o	675
10.006	47.00	0.850	55.3	0.069	0.00	1	0.600	o	675
10.007	38.00	0.400	95.0	0.000	0.00	1	0.600	o	675
1.008	24.00	0.048	500.0	0.000	0.00	1	0.600	o	900
1.009	3.00	0.050	60.0	0.000	0.00	1	0.600	o	300
1.010	55.00	0.230	239.1	0.000	0.00	1	0.600	o	300
1.011	15.00	0.063	238.1	0.000	0.00	1	0.600	o	300
1.012	71.00	0.802	88.5	0.000	0.00	1	0.600	o	300
1.013	49.00	0.207	236.7	0.000	0.00	1	0.600	o	300

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
7.005	S35	13.700	11.298	1.952	13.850	11.148	2.252		1500
7.006	S36	13.850	11.148	2.252	13.950	11.021	2.479		1500
7.007	S37	13.950	11.021	2.479	14.000	10.150	3.400		1800
7.008	S38	14.000	10.150	3.400	14.100	10.113	3.537		1800
10.000	S39	16.000	14.340	1.060	16.000	13.980	1.420		1800
10.001	S40	16.000	13.980	1.420	15.950	13.827	1.523		1800
10.002	S41	15.950	13.752	1.523	15.950	13.609	1.666		2100
10.003	S42	15.950	13.609	1.666	16.200	13.569	1.956		2100
10.004	S43	16.200	13.569	1.956	15.950	13.503	1.772		2100
10.005	S44	15.950	13.503	1.772	15.200	13.200	1.325		2100
10.006	S45	15.200	13.200	1.325	14.350	12.350	1.325		2100
10.007	S46	14.350	12.350	1.325	14.100	11.950	1.475		2100
1.008	S47	14.100	9.663	3.537	14.100	9.615	3.585		2400
1.009	POND	14.100	9.615	4.185	14.000	9.565	4.135		1350
1.010	HYD	14.000	9.565	4.135	14.000	9.335	4.365	9	1350
1.011	S48	14.000	9.335	4.365	13.850	9.272	4.278		1200
1.012	S49	13.850	9.272	4.278	13.250	8.470	4.480		1200
1.013	S50	13.250	8.470	4.480	9.371	8.263	0.808		1200

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Summary Wizard of "CRITICAL"(Rank 1 by Max Level)
Results for Design Storms

Margin for Flood Risk warning (mm)	300
DTS Status	ON
DVD Status	ON
Inertia Status	OFF
Analysis Time Step	Fine

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	20

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
1.000	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
1.001	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
1.002	15 Summer	100	20%	1	100/15 Summer			
1.003	15 Summer	100	20%	1	100/15 Summer			
1.004	15 Summer	100	20%	1				
2.000	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
2.001	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
3.000	15 Summer	100	20%	1	100/15 Summer			
2.002	15 Summer	100	20%	1	100/15 Summer			
4.000	15 Summer	100	20%	1	100/15 Summer			
4.001	15 Summer	100	20%	1	100/15 Summer			
2.003	15 Summer	100	20%	1	100/15 Summer			
2.004	15 Summer	100	20%	1	100/15 Summer			
1.005	15 Summer	100	20%	1	100/15 Summer			
1.006	15 Summer	100	20%	1				
5.000	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
5.001	15 Summer	100	20%	1	100/15 Summer			
5.002	15 Summer	100	20%	1	100/15 Summer			

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
4	1.000	19.763	1.288	12.962	1.19	0.0	69.9	FLOOD
3	1.001	18.711	1.436	10.726	1.58	0.0	138.5	FLOOD
	1.002	18.066	1.391	0.000	2.04	0.0	233.1	FLD RISK
	1.003	16.352	0.077	0.000	1.11	0.0	239.1	SURCH'ED
	1.004	15.774	-0.101	0.000	0.77	0.0	261.5	O K
2	2.000	17.165	1.365	4.801	1.20	0.0	189.4	FLOOD
2	2.001	16.159	1.312	8.825	1.25	0.0	323.0	FLOOD
	3.000	17.251	1.026	0.000	1.01	0.0	106.6	FLD RISK
	2.002	15.941	1.338	0.000	1.99	0.0	473.9	FLD RISK
	4.000	16.083	0.433	0.000	0.46	0.0	12.1	SURCH'ED
	4.001	16.068	0.818	0.000	0.67	0.0	39.1	SURCH'ED
	2.003	15.545	1.058	0.000	1.84	0.0	556.6	SURCH'ED
	2.004	15.206	0.817	0.000	2.40	0.0	556.6	SURCH'ED
	1.005	14.889	0.531	0.000	1.53	0.0	866.3	SURCH'ED
	1.006	13.849	-0.109	0.000	0.87	0.0	944.2	O K
2	5.000	14.807	1.282	6.974	1.75	0.0	230.5	FLOOD
	5.001	14.509	1.259	0.000	2.87	0.0	253.4	FLD RISK
	5.002	14.257	1.057	0.000	0.95	0.0	287.2	FLD RISK

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Summary Wizard of "CRITICAL"(Rank 1 by Max Level)
Results for Design Storms

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
5.003	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
5.004	15 Summer	100	20%	1	100/15 Summer			
5.005	15 Summer	100	20%	1	100/15 Summer			
5.006	15 Summer	100	20%	1	100/15 Summer			
6.000	15 Summer	100	20%	1	100/15 Summer			
5.007	15 Summer	100	20%	1	100/15 Summer			
1.007	15 Summer	100	20%	1	100/15 Summer			
7.000	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
7.001	15 Summer	100	20%	1	100/15 Summer			
8.000	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
8.001	15 Summer	100	20%	1	100/15 Summer			
7.002	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
9.000	15 Summer	100	20%	1	100/15 Summer			
9.001	15 Summer	100	20%	1	100/15 Summer			
7.003	15 Summer	100	20%	1	100/15 Summer			
7.004	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
7.005	15 Summer	100	20%	1	100/15 Summer			
7.006	15 Summer	100	20%	1	100/15 Summer			
7.007	15 Summer	100	20%	1	100/15 Summer			
7.008	15 Summer	100	20%	1	100/15 Summer			
10.000	15 Summer	100	20%	1	100/15 Summer	100/15 Summer		
10.001	15 Summer	100	20%	1	100/15 Summer			
10.002	15 Summer	100	20%	1	100/15 Summer			
10.003	15 Summer	100	20%	1	100/15 Summer			
10.004	15 Summer	100	20%	1	100/15 Summer			

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
2	5.003	14.001	1.201	1.159	1.29	0.0	314.6	FLOOD
	5.004	13.537	1.262	0.000	1.75	0.0	297.7	FLD RISK
	5.005	13.096	1.001	0.000	1.80	0.0	291.9	SURCH'ED
	5.006	12.752	0.767	0.000	0.95	0.0	294.6	SURCH'ED
	6.000	12.709	0.429	0.000	1.16	0.0	101.9	SURCH'ED
	5.007	12.474	0.794	0.000	1.20	0.0	356.4	SURCH'ED
	1.007	12.278	0.748	0.000	0.81	0.0	1241.5	SURCH'ED
3	7.000	14.606	1.431	5.852	1.31	0.0	60.4	FLOOD
	7.001	14.319	1.761	0.000	1.15	0.0	51.6	FLD RISK
1	8.000	14.751	1.426	0.532	1.25	0.0	56.0	FLOOD
	8.001	14.558	1.533	0.000	0.93	0.0	61.1	FLD RISK
3	7.002	13.873	1.615	22.755	1.98	0.0	142.9	FLOOD
	9.000	14.898	1.373	0.000	1.57	0.0	70.6	FLD RISK
	9.001	14.448	1.240	0.000	0.65	0.0	54.7	SURCH'ED
	7.003	14.003	1.908	0.000	1.61	0.0	186.1	FLD RISK
1	7.004	13.851	1.953	1.560	1.58	0.0	264.7	FLOOD
	7.005	13.674	1.926	0.000	2.03	0.0	340.2	FLD RISK
	7.006	13.147	1.549	0.000	2.26	0.0	371.3	SURCH'ED
	7.007	12.597	1.126	0.000	0.70	0.0	365.8	SURCH'ED
	7.008	12.217	1.617	0.000	4.21	0.0	343.7	SURCH'ED
1	10.000	16.005	1.065	4.866	0.55	0.0	292.9	FLOOD
	10.001	15.959	1.379	0.000	1.62	0.0	555.3	FLD RISK
	10.002	15.683	1.256	0.000	1.94	0.0	835.0	FLD RISK
	10.003	15.172	0.888	0.000	2.65	0.0	816.0	SURCH'ED
	10.004	14.746	0.502	0.000	2.21	0.0	830.5	SURCH'ED

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Summary Wizard of "CRITICAL"(Rank 1 by Max Level)
Results for Design Storms

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
10.005	15 Summer	100	20%	1	100/15 Summer			
10.006	15 Summer	100	20%	1				
10.007	15 Summer	100	20%	1	100/15 Summer			
1.008	15 Summer	100	20%	1	100/15 Summer			
1.009	960 Winter	100	20%	1	100/15 Summer			
1.010	960 Winter	100	20%	1	100/15 Summer			
1.011	360 Summer	100	20%	1				
1.012	120 Summer	100	20%	1				
1.013	360 Summer	100	20%	1				

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
	10.005	14.309	0.131	0.000	1.23	0.0	843.9	SURCH'ED
	10.006	13.667	-0.208	0.000	0.81	0.0	867.9	O K
	10.007	13.058	0.033	0.000	1.06	0.0	841.8	SURCH'ED
	1.008	11.648	1.085	0.000	4.00	0.0	2429.7	SURCH'ED
	1.009	11.359	1.444	0.000	0.62	0.0	38.2	SURCH'ED
	1.010	11.404	1.539	0.000	0.55	0.0	37.3	SURCH'ED
	1.011	9.506	-0.129	0.000	0.62	0.0	37.3	O K
	1.012	9.390	-0.182	0.000	0.33	0.0	37.0	O K
	1.013	8.629	-0.141	0.000	0.55	0.0	37.2	O K

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ENC 10

Mott MacDonald

Our ref RJM/NDS/STT/RMS/258633
T 0161 926 4189
E robert.m.smith@mottmac.com
Your ref APP/2008/6316

Metropolitan Borough of Wirral
Cheshire Lines Building
Canning Street
Birkenhead
Wirral
CH41 1ND

26 August 2010

FAO Matthew Rushton

Dear Sirs

Erection of a waste recovery Plant together with heat and power plant, ancillary buildings, plant and associated infrastructure
North Road Eastham Wirral CH65 1AJ

Further to granting of planning permission, on 29 July 2009, for the above development, subject to a number of conditions, negotiations have continued with the Environment Agency (EA) and the Peel Ports Group (the Manchester Ship Canal Company-MSCC) in respect of Planning Condition 9.

We enclose correspondence from the EA and MSCC confirming that the development may discharge up to 37.1 l/sec to the Manchester Ship Canal Company. In consequence, the redesigned on site drainage infrastructure now requires an attenuation pond with a storage capacity of 350 m^3. Calculations are also included in support of the revised permitted discharge and storage pond requirements.

In designing the site sewerage and layout consideration has been given to the potential effects of flooding resulting from storm events exceeding the design criteria. To this end, we attach a mark up of drawing No HP-258633-SL-001 Rev P2 Proposed Drainage Layout and Flood Routing Plan demonstrating that overland flood flowpaths arising from exceedance rainfall events are directed away from building interiors whilst being controlled and retained within the development site boundaries.

We confirm that the pond, as detailed on the accompanying drawing No. HP-258633-SL-001 Rev P2 Proposed Drainage Layout, complies with the Habitat Management Plan submitted in support of the application.

THE SUNDAY TIMES 25 BEST BIG COMPANIES TO WORK FOR 2010

Mott MacDonald

We trust you find this information useful however should you wish to discuss in greater detail then we are more than willing to visit your offices to discuss further

Yours faithfully,

RM Smith
for
Mott MacDonald

Encs.

Appendix A - Correspondence
Appendix B - Calculations
Appendix C - Drawings

DRAFT

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Appendix A - Correspondence

Correspondence with Environment Agency and Peel Ports Group (the Manchester Ship Canal Company)

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Appendix B - Calculations

Drainage design calculations

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Appendix C - Drawings

Drainage Layout Plans

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APPENDIX B

Drawings:

- ***Drawing NEB1 – Balancing Pond***
- ***Figure 1 – Site Location Plan***

Drawing NEB 1

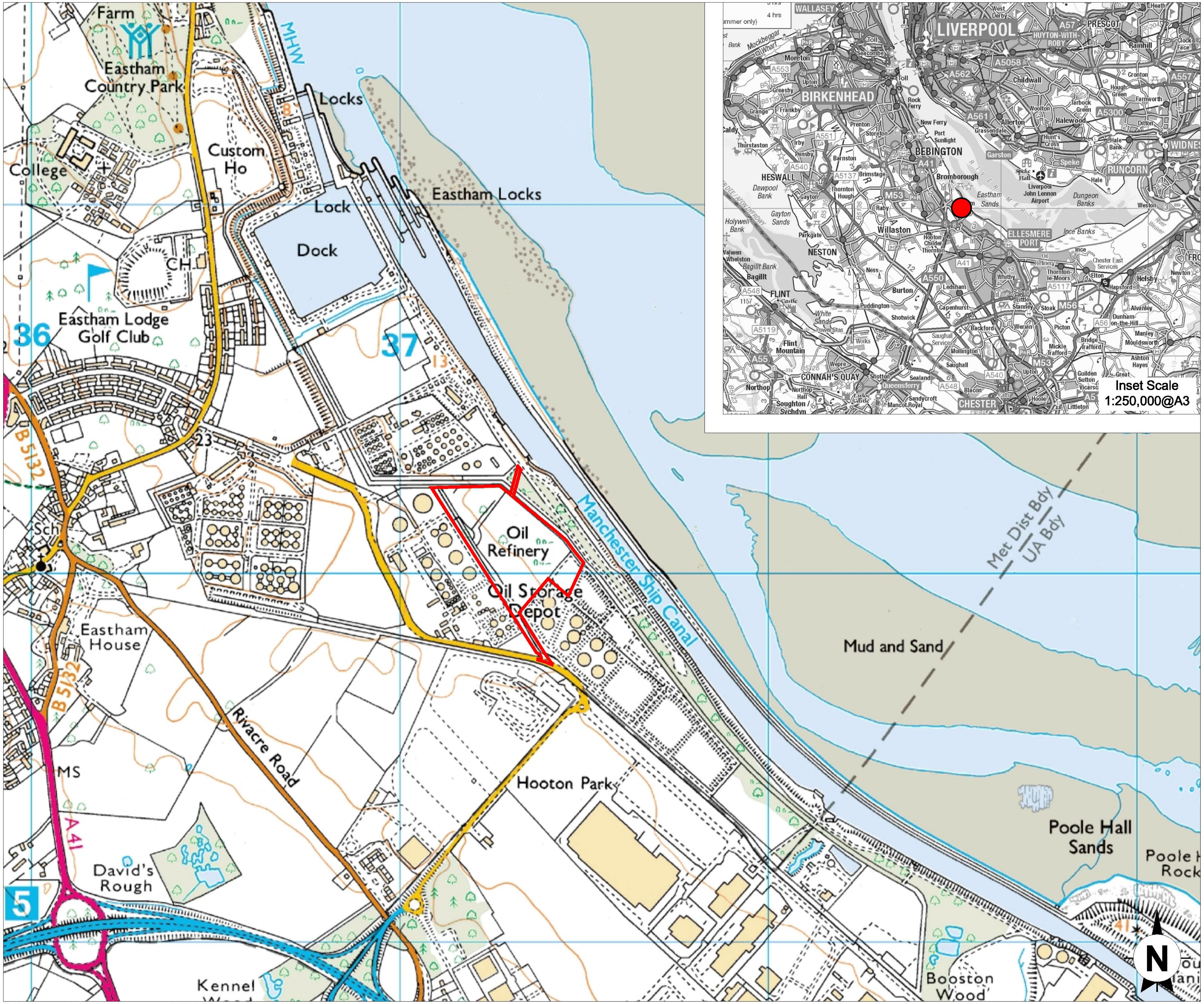
This supersedes Drawing 2561/CAR/002 Rev P3 for the northern part of the site, particularly in relation to the details of the balancing pond, log piles and earth mound.

This drawing should be read in conjunction with drawing 2561/CAR/002 Rev P3

Date 1 February 2011

Scale 1:1000 at A3

Do not scale from this drawing



axis

Site Location

Application Boundary

HOPSEF
Biossence Hooton Ltd

Figure 1

Site Location Plan

Scale	Date
1:10,000@A3	May 2013

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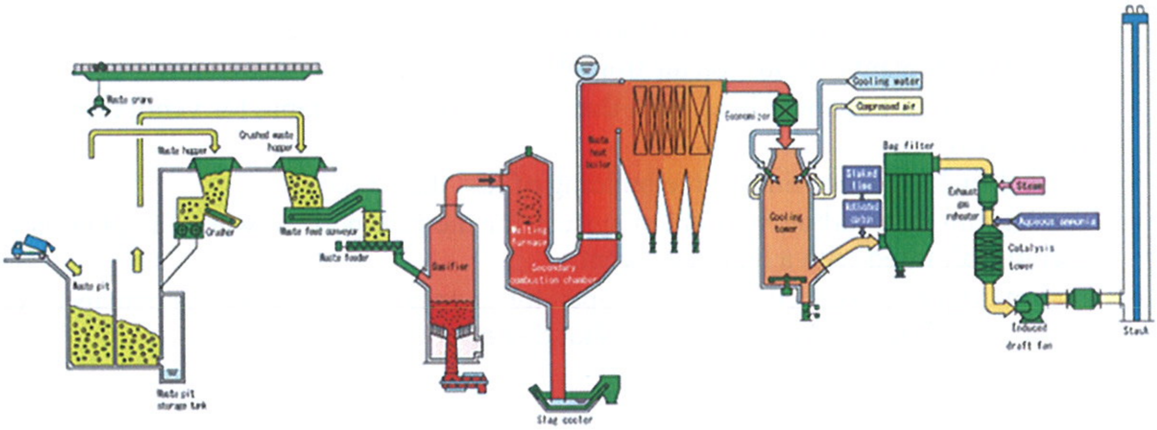
Appendix 25 Odour

Hooton Bio Power LTD

Odour Management Plan

AUTHOR: D Mitchell CoGen

DATE: September 2017 V1



This Odour Management Plan is in support of the Hooton Bio Power Ltd (HBP) proposed power plant at Hooton Park Ellesmere Port. This document supports the application for permit variation

The Permit Variation Application reflects the evolution of the project to purely a processing (gasification) plant for RDF with limited front end processes requiring sorting of the residual waste offsite – onsite Pre-treatment is now limited to shredding of over-sized material and metal removal when required.

Following an extensive review of the technologies available, a technology from Kobelco Japan has been selected. The Kobelco Advanced Stage Gasifier technology is most appropriate since it operates at a lower furnace temperature making it especially suitable for challenging fuels like RDF, which has a low ash-softening temperature. Two separate independent treatment lines will be used which maximises availability.

Fuel for the plant is pre-treated waste. Contracts for supply of this RDF material have been secured thereby removing the need for a MRF on site (as was in the original plan) and also the need for storage of material onsite.

The gasification facility will have an annual throughput of 204,000 dry tonnes per annum of prepared refuse derived fuel RDF which will be delivered to site by commercial and industrial waste management customers and generate approximately 28 MW (gross) of electricity from the gasification The facility will be Combined Heat and Power (CHP) fully enabled for the export of heat.

Modern EFW facilities are often built in urban areas and operate close to or even adjacent to housing without issue or complaint of odour.

The HBP facility at Hooton Park will use a range of techniques commensurate with best available techniques (BAT) used by a modern EFW for control of odour.

Specifically:-

- Off site preparation of the RDF fuel
- Only source segregated and pre prepared waste used without putrescibles
- Inspection and if required rejection of each load for odour
- The use of an enclosed tipping area fitted with fast acting doors
- Extract of all plant combustion air from the tipping floor.
- The use of two treatment lines such that one is always available for ventilation of the tipping hall
- Typical fuel residence time in the building of less than 3 days
- The backup of a carbon ventilation system for the rare periods when the plant is not operational, fitted with a high level vent.
- Fuel management procedures by the operator to ensure that material is managed such that it is minimised when the plant is shut down.

1. General

Above project are to receive and incinerate domestic waste and produce electric power for the public grid.

Waste will be delivered from an ex-situ waste collection and processing facility, but since waste is potentially odorous and the plant located within an industrial area with sensitive receptors nearby, it is essential that the plant will not give rise to neighbour odour nuisance.

This document briefly describes plant characteristics designed to ensure that the facility will not give rise to odour nuisance.

2. Main plant capacity and performance characteristics

The facility will be based on Advanced Conversion Technology in the form of bubbling bed thermal gasification followed by steam generation in a syngas fired boiler for steam turbine electricity production/energy recovery.

The plant will consist of two gasification/boiler lines, each with a nominal waste gasification capacity of 12.5 t/h, total 25 t/h, with a common steam turbine generator (STG) and air cooled condenser (ACC) for electricity production.

Nominal thermal input is about 88 MW_{th} (total two lines), allowing for a gross electricity production of approx. 27 MW_e and net electric export about 24 MW_e after internal consumption and losses.

Above waste handling capacity is based on nominal waste quality with about 25% water content and about 20% (dry) ash content. The actual waste tonnage processed will vary according to calorific value, equivalent to thermal input about 88 MW_{th}.

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Each gasifier/boiler line consume about 70,000 Nm^3/h combustion air at full load, of which approx. 15,000 Nm^3/h is primary air for gasification and approx. 55,000 Nm^3/h is secondary and tertiary air for final combustion of syngas.

The plant will operate continuously at full load except for a planned annual service outage, with an operating time per line of the order 7,500 – 8,000 hours per year, allowing for a few unplanned short stops.

A level of equipment redundancy is included to support above continuous operation with minimum unplanned stops.

3. Odour characteristics

3.1 Reception and handling

All incoming waste shall be delivered in closed trucks, minimizing the risk of odour escaping transport vehicles in the vicinity of the plant.

Apart from a brief registration and weighting stop within plant gate trucks will be directed to a closed unloading hall and all subsequent unloading, handling, treatment and buffer storage will take place indoor under controlled ventilation and air treatment conditions.

Waste storage amount within the plant will be kept at a minimum to allow for uninterrupted 24/7 operation, i.e. maximum about 3-4 days consumption to schedule regularly waste deliveries within normal weekday hours only.

3.2 Waste handling & processing facility

Waste handling within the facility consists of following steps:

- Unloading from truck into a pit within a ventilated unloading hall.
  The unloading hall contain several unloading bays to minimize outdoor truck waiting time, each with fast moving gates to avoid odour migration from building interior.

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- Waste mixing (as required) and removal from pit unloading areas.
- Feeding by crane from unloading pit to one of several coarse shredders, to prepare waste for gasification.
- From shredder outfall waste is moved by crane to an indoor buffer storage bunker.
- From buffer storage bunker waste is fed by crane to a feeding hopper for one of the two gasifier lines.

The first 4 activities above mainly take place during waste reception opening hours plus possibly a limited period after last truck delivery to empty unloading pit, i.e. generally day time.

During nights and weekends gates will remain closed and only the last activity, i.e. boiler feeding and possibly buffer storage mixing, will take place.

3.3 Building arrangement and ventilation

From a ventilation point of view the interior waste handling facility is arranged in 3 sequential compartments/areas as follows:

- Reception and unloading hall from entrance gates to edge of unloading pit.
- Unloading pit and shredder area with crane operation
- Buffer storage and gasifier feed hopper area with crane operation

To avoid odour escaping to the environment and to obtain best possible interior working environment, the entire building is continuously ventilated and purged in the waste flow direction, i.e. from entrance gate area to the interior of the waste buffer bunker where air is extracted.

This ventilation flow direction/sequence ensures best fresh air purging of the truck tipping area where main human activity occurs and odour load is lowest.

At the unloading pit front, where a substantial building height is required for truck tipping, a partial and flexible curtain may be suspended from the roof to focus air flow drawn from front gates to pass over the top of the unloading pit, which contain the freshly unloaded waste and involve waste handling.

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Air, which then flow further into the interior, pass shredders where odour may escape/develop and flow over the buffer storage waste where further handling occur to remove and catch odour for treatment.

These areas are generally with low operator activity and dedicated local service areas such as around shredders or in crane service pits will be fitted with suitable local fresh air ventilation to be switched on as required during service activity.

Above the unloading pit a mist air system will be installed to allow for dust suppression if this should be deemed necessary depending on waste characteristics. Based on waste characteristics and moisture level dust suppression should not be required under normal circumstances.

Unloading and crane operation will at all times during waste reception opening hours be supervised from a fresh air ventilated operator cabin overlooking the unloading and shredder area.

To secure a sequential flow essentially as described above, it is foreseen to assist air entrance by forced air inlets along the truck gate entrance façade, directing fresh entrance air in the general direction toward the unloading pit and further into the interior of the building.

This air flow will be frequency modulated and offset in relation to combustion air fans to ensure that there will be a certain air deficit in the waste handling building to be drawn through passive openings or leaks, thereby preventing unintentional odour migration to the environment.

3.4 Ventilation flows and treatment

Normal operation

During normal operation secondary and tertiary combustion air will be drawn from the waste handling area (the far end of buffer storage bunker as described above), i.e. up to approx. 110,000 m^3/h.

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This will ensure that the entire waste handling building/compartments is under weak vacuum/inward leak flow and prevent odour from escaping to the environment/surroundings.

Since all fresh air will pass through the reception building truck unloading section up to front of unloading pit, which is of dimensions approx. 25 × 25 × H_{avg} = 25 m with volume approx. 15,000 m^3, this area will in normal full load operation be with an air exchange ratio above 7 per hour, and still more than 3 per hour with only one line in full load operation.

Odour contaminated air drawn from the reception and storage building will be effectively treated in the gasification process, reaching a temperature of at least 850 °C for a minimum of 2 seconds as required by IED for waste gasification.

This will ensure effective destruction of all odorous substances. Eventually the air in the form of flue gasses and excess air will, after having passed the flue gas treatment facility, be discharged through the facility's flue gas stack for effective dispersal.

Primary air for the gasification process is drawn from the separate gasifier/boiler building to recover heat loss and improve conversion efficiency, as well as securing an acceptable thermal working environment in this section of the plant.

The combustion side of the gasification and boiler process will be under negative pressure, created/maintained by the induced draft (ID) fan downstream the flue gas treatment facility. Consequently there is no risk of Odour (or other harmful components) escaping from combustion air and syngas before being effectively destroyed in the boiler combustion process.

Operating schedule

As mentioned above plant will be in 24/7 operation most of the year.

The plant consists of two essentially separate lines. In order not to interrupt waste reception capability planned service on each line will be offset to maintain

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operation with one line during most service activities, thus securing normal ventilation and odour treatment most of the year.

With one line being down remaining combustion air ventilation will still remain substantial (approx. 50,000 m^3/h) and capable of keeping the waste handling areas under negative pressure/inward leaking flow. Furthermore waste handling intensity will be somewhat lower during such periods releasing fewer odours.

Back up ventilation and treatment

Some plant facilities such as the ACC are common for both lines.

When such equipment need servicing it may be necessary to shut down both gasification lines and thus loose natural gasification/combustion air ventilation and odour treatment.

Such periods are foreseen not to occur for more than up to 2 weeks a year, predominantly planned, although unplanned trips and shut downs cannot be entirely ruled out.

In case of short term electrical grid export trips or STG failure/service, the plant will be able to continue operation in steam by-pass mode without interruption of waste handling or ventilation/odour treatment.

During planned total stops waste deliveries will be diverted and buffer storage consumed up to planned stop.

During unplanned total stops, depending on duration forecast, waste reception may continue for a limited period, but otherwise it will be diverted as soon as possible.

In any case, planned or unplanned, some amount of waste will remain within the waste reception, handling and storage area during such stops, potentially releasing odour without the opportunity to draw air for the gasification/combustion process.

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To cover such periods a back-up ventilation and odour treatment facility will be used to maintain waste handling building under negative pressure and with an inward leak flow.

This back-up facility will consist of a ventilation unit with a nominal air flow of 35,000 m^3/h, roughly equivalent to one gasification lines normal part load secondary/tertiary air consumption, with activated carbon filter cartridges to absorb odorous components from the ventilation air.

In this situation, generally with reduced waste reception and handling intensity, the air exchange ratio in unloading section will remain higher than 2 per hour.

Activated carbon (AC) for odour reduction is a well-known method with typical reduction of the order 90-95% until saturated and active filling is replaced.

It is also relatively simple and suitable for long term reliable stand-by functioning and easy start up compared to more complex technologies typically used for continuous operation. Operational costs (cartridge replacement) may be somewhat higher than other technologies, but with the short operating time foreseen in this application this is not problematic.

Treated air from this unit, which may still contain residual odour, will be discharged via a duct leading to the top of the boiler building (elevation approx. 37.5 m), being discharged vertically some meters above roof (i.e. about 40 m above ground level) with a vertical velocity of minimum 15 m/s.

This will ensure effective dispersal of any residual odour and prevent diffuse migration of odour from the plant buildings during outage.

Although not foreseen to be necessary, the back-up ventilation unit may also be put in operation during “one line operation” to augment the ventilation rate within the reception area if conditions dictate this (e.g. hot season with extra odour or more odorous waste than usual etc.).

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Judging whether supplementary ventilation is needed during one line operation, or other atypical operating conditions, will be based on the regular odour monitoring walk about forming part of the operational phase odour monitoring program.

A preliminary odour dispersal study (using the US-EPA Screen 3 model), based on back-up ventilation release at boiler building top indicate a minimum dilution rate before ground level impact of about a factor 1/1000 (ref. attachment A), even when considering potential building downwash (from boiler building), urban setting adjoining surface roughness and no thermal plume buoyancy.

Ventilation air odour content is, based on experience from other waste treatment plants, expected to be in the range 1,000 – 2,500 OU/m^3 (Odour Unit) before treatment, and with a activated carbon filter efficiency of minimum 90% residual odour content at point of release can be expected to be in the range 10 – 25 OU/m^3.

With expected release concentration of 10 – 25 OU/m^3 after activated carbon treatment and a minimum dilution factor of 1000, ground level impact is expected far below 1 OU/m^3 (human perception level).

Even in case of a complete absence of filter reduction the predicted maximum ground level impact would remain below 3 OU/m ^{3}, corresponding to the nuisance threshold level normally defined for such facilities.

A somewhat higher dilution rate could be achieved by ducting treated ventilation air to the top of the main stack. However, in view of layout this would be a very complex and costly solution without any appreciable benefit for receptors in view of above prediction with an impact below human perception level.

Furthermore such solution would also involve a higher auxiliary power consumption impacting on the plants net electrical efficiency.

Figure 1 illustration below (a variant of appendix A consideration) adjusted so that result in micro-g/m^3 correspond to OU/m^3 show predicted ground level impact as function of distance.

Currently there are residential areas to the West and South at a distance of about 900 m ref. Figure 2 below.

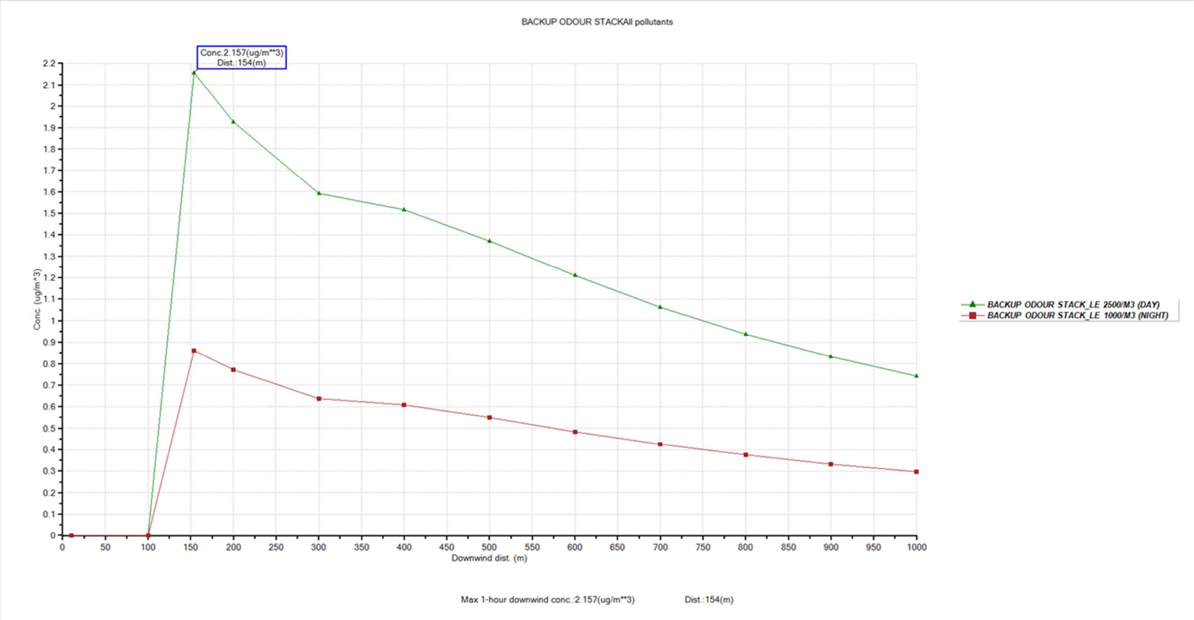

Figure 1: Screen 3 Ground Level Odor impact estimation (1 micro-g/m3 ~ 1 OU/m3 based on release concentration without AC reduction of 2500 & 1000 OU/m3.

As seen from above Figure 1 the predicted odour impact at these particular distances <u>even without any AC reduction</u> is about 0.83/0.33 OU/m^3 @ 900 m where the two values correspond to 2500 OU/m^3 and 1000 OU/m^3 respectively.

With any reasonable AC filter reduction, eg. minimum 90%, these values would of course be much lower and well below human perception level.

At distance 50 m (assuming worst case with a mixed industrial/residential development) Screen 3 does not predict any impact at all from the 40 m high boiler

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building top release, since the plume simply pass overhead of these adjacent receptors.

Figure 2: Hooton site map and surroundings.

A full dispersion model assessment of the proposed ventilation release and of the odour control system using Advanced Dispersal Models may if required be provided at the Environmental Permit application stage. Given the significant headroom of the odour control system as described above it is not anticipated that there will be any difference in these findings from the study herein.

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Attachments

A: Screen 3 dispersal calculation as plot with explanation and model print out.

B: Lay-out principle drawing of vented waste handling building.

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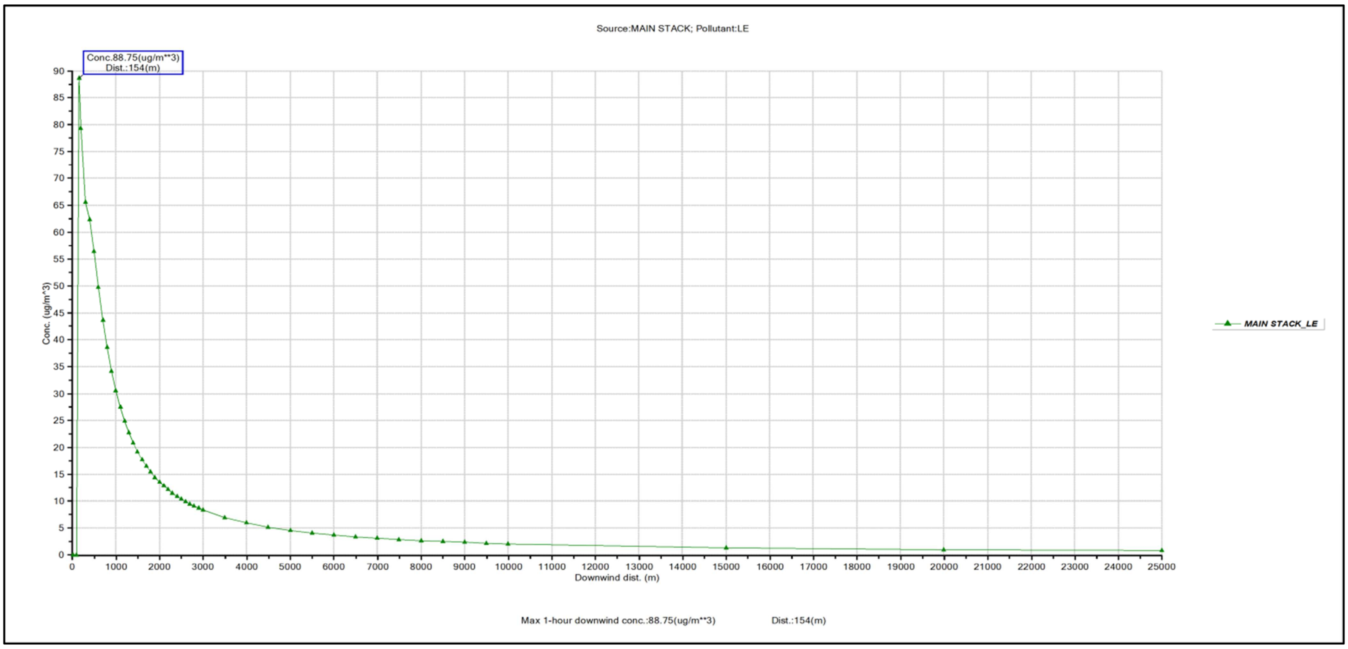
Screen 3 dispersal calculation plot & result listing



Screen 3 dispersal result of a calculation with following main characteristics:

- Vent flow 35,000 m^3/h
- Exit and ambient temperature 20 °C (293 °K)
- Exit velocity 15 m/s
- Release height 40 m (approx. 2.5 m above boiler house)
- Building effect/downwash considered for boiler bldg. H=37.5 m
- Urban surface roughness/atmospheric turbulence
- Full meteorology (all stability classes and wind velocities)

- Pollutant emission rate 1 g/s ~ 103 mg/m^3 in 35,000 m^3/h flow

- Max. ground level conc. 88.75 micro-g/m^3 at distance 154 m (Stability A with 1 m/s wind speed), corresponding to a dispersal dilution factor 1:1,160.

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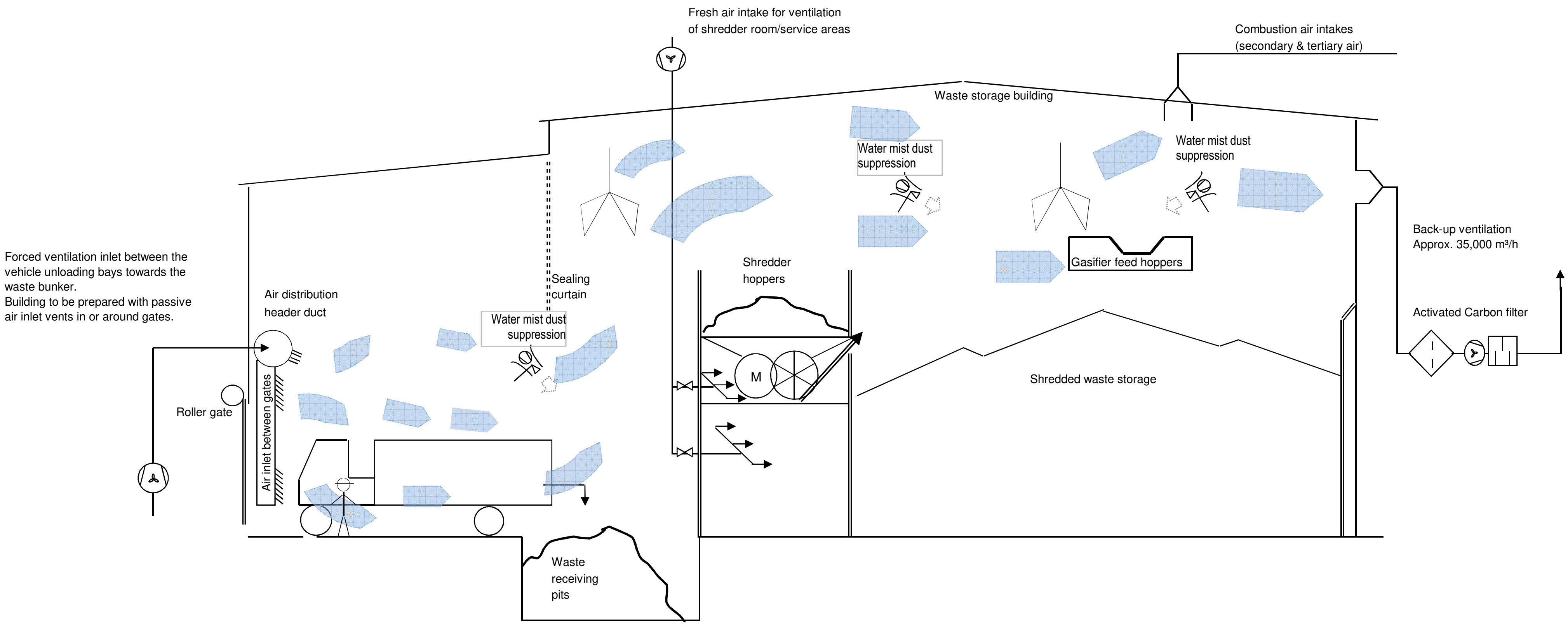

Capacity values , sizing and layout are for guidance only and are not subject to guarantees,
final diagram and values will be in accordance with detailed design.

Rev.	Date	Description	Checked	Approved By

Hooton Bio Power

CoGen | BWSC Burmeister & Wain Scandinavian Contractor A/S | KOBELCO ECO-SOLUTIONS CO.,LTD. | Sartech

Project: Hooton Bio Power Project
Project No.: 2031
Feedstock building ventilation Illustration

2018.12.13	HSW	0
Date	Issued by	Rev.

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DATE: 2019.01.28

LOT NO.: **LOT no. 0094**

PROJ. NO.: **2031 - Hooton Bio Power Project**
SUBJECT: **Process - Odour related technical description**

Drawing and/or document specification – please go to page 2.

Transmittal purpose:

X	For Information		For Review/Approval		Certified for construction		As built

REMARKS:	This is the document requested as item 4 in "HBPL-RFI-0001" of December 7, 2018. As it has also been the case for the other follow-up's on "HBPL-RFI-0001" this documents is submitted now as our latest revision on a non-contractual basis.
CC:	Mr. Chris Williams, CoGen Mr. Andy Pickstock, CoGen Mr. Mike Drummond, CoGen
DATE ISSUED:	2019.01.28
ISSUED BY:	MFA/anmi SIGNED: Martin F. Autzen

LOT NO.: **0094**

SUBJECT: **Process - Odour related technical description**

BWSC Document No.	Rev. No.	Supplier Drawing No.	Rev. No.	Document Description	Copies #	Format
2031.S4.X01.001	01			Odour related technical description	Electronic	pdf