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ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS, KWAZULU-NATAL.

DRAFT BASIC ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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Environmental Management

EXECUTIVE SUMMARY

Rock Environmental Consulting was appointed by Steynsburg Pork and Abattoir (Pty) Ltd. for the application for authorization for the proposed 4800 sow unit piggery on the Remaining Extent of the farm Steynsburg 7803-GS. This includes the 5 sections on this property applied for.

LOCALITY AND STUDY AREA

Proposed 4800 sow unit piggery to be established 21 km northwest of Bergville on the Remaining Extent of the farm Steynsburg 7803-GS, KwaZulu-Natal. Entrance to the property is from the R74 right across from the access road to ATKV Drakensville. From Bergville BP filling station, in a westerly direction, on the R74, the turnoff to the farm is about 24.5 km on your left hand side. GPS Coordinate is: 28° 38'9.55"S, 29° 8'33.22"E.

The project will consist of a pig housing complex on sites 1, 2 & 3 plus the manure processing facility and the feed factory. The different piggery complex components and taking into account that the construction footprint is usually somewhat more than it is predicted, the site will cover an area of 15.6 ha. Site 1 will cover in the order of 4 ha; site 2 will cover an area of 1.7 ha; site 3 will cover 7.7 ha; the feed factory and the manure processing plant will cover an area of 3.3 ha.

PROJECT DESCRIPTION

As per applicant:

All designs are based on the latest SARPO and the European Union's new pig regulations and legislation. We have exceeded these requirements due to our personal objectives of animal welfare and to the environmental responsibilities.

All the buildings and equipment are designed with the above objectives in mind. The pigs will be free at all times except during lactations. This is to prevent the sows from injuring the piglets when they are just born. Once these piglets are strong enough to

fend for themselves the farrowing crates will be opened to give the sow more space. The pigs welfare is placed at all time as priority number one.

Each production centre has a special care centre for sick or injured animals. The hygiene in the units is paramount and will be administered to prevent any disease spread. All humans will be required to shower and be disinfected when entering and leaving the units.

The effluent from the units is all organic and will be sold as organic fertiliser and organic liquid. The effluent will be stored under the houses in slurry pits and flushed every 14 days to prevent any ammoniac developing. No water will be required to flush the organic effluent from the buildings. The effluent will be piped to an effluent separation sections to prevent any contact with soil, or the nearby surroundings. The organic solids will be separated from the liquid by means of a separation press. The dry matter will be stored for selling to the surrounding farms and the organic liquid will be stored in a lined dam for fertigation through the nearby centre pivots. The above organic fertiliser will be used on 1200 ha of maize and soya fields

Water will be harvested from all the 65 000 sq/m roofs for use in the piggery. This will amount to $\pm 50\,000\text{ m}^3$ a year, which is about 40% of the requirement of the farm.

The farm will also make use of solar energy for the heating of all the water for washing purposes. We have also made provision for a biogas plant in the future when it became viable

The production units are as follow:

Site 1	Breeding and Farrowing
Site 2	Weaner and finishers
Site 3	Finishers

The unit is designed considering the following norms:

Sows:

4800 sows 28 weaned piglets per sow a year.

114 days pregnant 28 days in lactation 150 day sow cycle = 2.4 farrowing are per year

Replacing 45/50% sows a year AI with some natural services

Gilt Development:

Breeding stock will be selected at 28 days from the farrowing house and housed in the gilt development nursery. Breeding will take place every 2 weeks with 14/15 sows to supply 100 gilt weaners. This selected stock will be kept in 2 sections for 42 days and then moved to the development section. Breeding stock will be kept in groups of 18 up to 180 days or first heat. These gilts can be served by a V-Boar, or and moved to a gilt pen for 1 to 2 weeks before introduced to the ESF training section for 5/6 weeks. Two week before Insemination 50 gilts will be moved to the AI section to get used to AI crate. Provision is made for 116 gilt crates. By introducing the gilts earlier to the AI crates will improve the conception rate. The gilts will only be kept in crates for insemination. The rest of the time the sow will be free to walk around

The Gilt training section is a part of the breeding house. This section will hold 50/60 gilts in different stages from 180 days to 220 days. Gilts will be kept in pens on arrival from the development section and then moved to a training section to be introduced to the ESF stations. Gilts will be exposed to a boar. The gilts will be in contact with the detection boar. As they come on heat the gilts will be marked with a colour so that you can identify them. This will assist your stockman as gilts are sometimes difficult to recognise when they come on heat the first time.

This system will then daily select all gilts that are on heat. From here they will be moved to the AI section to be served and introduced into the sow herd. We have made provision for the gilts to be moved to the AI section two week before insemination

Breeding/ AI:

Gilts will be kept in special Gilt AI crates and the sows in sow AI crates. Boar gates are fitted in front of every 7 sows.

Sows will stay in AI section for 7 days and then moved to the early gestation for 35/40 days. In this section the sows can be kept in crates or as free sows by opening the gates. After 35/40 days, and the sows are certified pregnant, they will move to the gestation house. The sows will be accommodated in an open house with the ESF station with 2.3 m² space each. Each sow will be individually fed by the ESF station. The sows can eat at their own time when they are in need of feed. This is an advantage as the sow is protected during feeding and the feed can be altered for the individual sow.

Farrowing:

The sows will be in the farrowing house for 26/28 days. The farrowing house will house 60 sows in 20 rooms on slats with anti-Crushing crates. These crates prevent the sows from crushing the piglets. In the design of the Plantkor sow stall, special attention was given to animal comfort with an optimum sanitation. This reduces the mortality to less than 6% below the norm.

Weaners:

- Weaning on 28 days 7/8 kg;
- 49 days in weaning house with a daily average to reaching +/- 30 kg;
- 3 to 4 % mortality;
- Required temperature is 27 degrees for the first two weeks and reducing by 1 degree per week.

There are 8 rooms with 2800 pig spaces. Each room is divided in 72 pens of which 2 are divided to be used as special care pens. The Ventilation is our unique system that allows us to ventilate up to 70 cub meters of air per weaner in one hour without causing a draught. This is essential in South Africa's hot summer months.

Finishing Pigs

We have made provision for 1400 pigs per building up to a max of 100 kg live weight. There are 26 buildings with 80 pens of 17 pigs per pen. One pen is divided into two special care pens per building. We have allowed 0.882 m² per pig.

We have made provision for 1 feed line. One silo will be used for the different feeds.

ASSESSMENT AND CONSIDERING ALTERNATIVES

Feasible alternatives can be considered at this stage. The location is a pre-existing property. This is also the only property available to the applicant at this stage. Minor movements on this property can be considered. Alternatives in terms of layout could be considered. This will be determined where on the available area the development will have to be placed in the most effective way. The technology to be used and in commercial farming with pigs to this extent and scale i.e. different pig units (climate controlled), manure removal, feeding and watering systems, etc. is of the latest used standards. As a rule this high standards in pig farming technology must be implemented when farming with a 4800 sow unit, and in order to maintain a sustainable market share.

The current electrical power provision is through the normal Eskom network. As an alternative to this part of the technological layout of the facility, the provision of electricity through solar energy generation can be considered as an alternative. This can imply the installation of visible solar panels for partial or self-sustaining electricity provision to the facility.

No Go Option

A “DO NOTHING” alternative would be not to use the current property and let it stay natural veld for grazing, as well as for the current farming activities like goats and sheep. On the other hand, no additional job opportunities will be created and no contribution will be made to the upliftment of the community and infrastructure development. Thus, if not developed this positive impact will not be seen.

PUBLIC PARTICIPATION PROCESS

The Public Participation Process was conducted from 13 to 15 June 2016 and is still in progress.

- Background Information Documents (BIDs) were distributed to adjacent landowners as well as other Interested and Affected Parties (I&APs) from the 13th to the 15th of June 2016 (please refer to Appendix 5A for a copy of the BID as well as proof of the distribution of the BIDs).
- Site notice was erected/placed at the entrance to the property on 13 June 2016 (please refer to Appendix 5D for a copy of the Site Notice as well as proof of the erection of the Site Notice).
- A press advert was placed in the 'Ladysmith Gazette' newspaper on the 17 June 2016.
- The ward councillor (Ward 10), local municipality, Water Affairs and Sanitation and AMAFA was informed by means of Background Information Document (written notification) in this period.
- The anticipated impacts and issues, positive and negative, were identified from I&APs, in order to determine their potential significance and the need for further assessment during the subsequent EIA process which is in progress.

THE BASIC EIA PROCESS

During the course of this EIA assignment the following actions and steps are required and will be followed in accordance with the Regulations set out in Government Notice No. 982 of 2014 of the NEMA:

- An Application for Authorisation, signed by the Applicant, together with a Declaration of Independence, which was signed by the environmental assessment practitioner, will be submitted to the KWAZULU-NATAL DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM & ENVIRONMENTAL AFFAIRS (EDTEA). This will coincide with the submission of the draft Basic Environmental Impact Assessment Report (BAR).

- The Public Participation Process will inform the public about the proposed process and input, comments and suggestions will be requested.
- The draft BAR with an Environmental Management Program (EMPr) will be made available for comments to the EDTEA and registered I&APs, the local authorities and all other applicable stakeholders. The draft BAR & EMPr will also be available to be viewed at the municipal library in Bergville
- All issues from the will be addressed in the final BAR & EMPr, as well as issues and impacts identified by the Environmental Assessment Practitioner (EAP). The issues identified in the specialist studies will also be addressed in the final BAR & EMPr.
- The final BAR & EMPr will also be made available to the public for review.
- The final BAR & EMPr will be submitted to EDTEA for review.
- Once the EDTEA accepts the final BAR & EMPr, an Environmental Authorisation can be issued.

The BAR & EMPr was made available for comments to the registered I&AP's. Comments received from I&AP's on the contents of the draft BAR & EMPr will be incorporated into the final BAR & EMPr. By making the draft report available, ensures that all issues have been identified.

CONCLUSION

The purpose of this BAR has been:

- To provide a project description, and an overview of the proposed development activities on site.
- To provide a description of all the important environmental elements of the study terrain.
- To provide descriptions of all anticipated/identified biophysical and social-economic issues and impacts that could potentially occur as a result of the proposed development.

In summary it can be concluded that different parts of the proposed upgrading and widening of the N4 will experience different effects or impacts on the environment. These are:

Environmental components to be affected negatively	Description of the anticipated environmental & socio-economic impacts / key issues
Properties	<ul style="list-style-type: none"> Noise, Odour and safety impacts.
Possible Odour Impact	<ul style="list-style-type: none"> Odour from the piggery, if not managed properly, could cause an irritation to adjacent land owners.
Traffic impact	<ul style="list-style-type: none"> The development will also affect the local community in a possible negative way, during the construction phase, as traffic into and out of the farm may cause congestion.
Business areas	<ul style="list-style-type: none"> Positive impact: This development will attract business to the areas and boost the local economy. Job creation is a great possibility.
Water provision	<ul style="list-style-type: none"> A possible increase in water demands due to the proposed development on this piece of land.
Ground Water	<ul style="list-style-type: none"> Abstraction of ground water not possible at this stage. Contamination from the slurry treatment facility could pose a risk to ground water.
Habitat loss	<ul style="list-style-type: none"> Loss of natural vegetation due to the proposed development, although the loss of habitat, proportionally to the wider region of similar natural vegetation, will be very small.

Anticipated and potential significant impacts that have been identified relating to the development were evaluated in terms of their significance.

The essence of any EIA process is aimed at ensuring informed decision-making and environmental accountability, as well as to assist in achieving environmentally sound and sustainable development. This is achieved by conducting an analysis of the potential impacts that a proposed development may have on the physical, environmental and social aspects of the concerned area. In order to minimise the potential impacts associated with the proposed development, an EMPr is attached, which must be implemented in order to sufficiently mitigate the anticipated impacts to an acceptable level.

The draft BAR & EMPr gave an account of the environmental qualities and attributes of the study area and described the details of the proposed development in terms of the anticipated impacts/issues or interaction that the development may have with the different environmental components. The response to issues raised by members of the public is made available for comments for a period of thirty days. This is to determine whether all matters have been covered and addressed to their satisfaction.

The EAP (REC Services Pty Ltd.) is of the independent opinion that the EIA process did conclusively determine if there are any fatal environmental flaws associated with the proposed development that would constitute the refusal of Authorisation of the project - bearing in mind that approval must be subject to strict implementation and monitoring of the EMPr, and given that there should be room for improvement on the EMPr as the project progresses. It is trusted that this BAR & EMPr gives a balanced view of the anticipated environmental impacts or issues associated with a proposed development of this nature.

ENVIRONMENTAL APPLICATION

Adherence to Regulatory Requirements, Regulation No R. 982 of 4 December 2014, Appendix 2, published in terms of the National Environmental Management Act, 1998 (Act 107 of 1998).

Contents of a Basic Assessment Report <u>as stipulated</u> in R. 982 (Appendix 1, Point 3)		Covered in this Report
Appendix 1 Point 3	A basic environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include:	
(a)	Details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Chapter 1 Appendix 6
(b)	The location of the activity, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Chapter 4 Appendix 3A
(c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is: (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Chapter 4 Appendix 3A Appendix 4A
(d)	A description of the scope of the proposed activity, including: (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and	Chapter 4 & 5

	infrastructure;	
(e)	<p>A description of the policy and legislative context within which the development is proposed including-</p> <p>(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and</p> <p>(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;</p>	Chapter 3
(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Chapter 4
(g)	a motivation for the preferred site, activity and technology alternative;	Chapter 4
(h)	<p>a full description of the process followed to reach the proposed development footprint within the approved site, including:</p> <p>(i) details of all the alternatives considered;</p> <p>(ii) details of the Public Participation Process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;</p> <p>(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;</p>	<p>Chapter 4, 5, 6 & 7</p> <p>Appendix 5 a-f</p> <p>Chapter 8, Appendix 1</p> <p>Chapter 9</p>

	<ul style="list-style-type: none"> (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts: <ul style="list-style-type: none"> (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives development locations for the activity were investigated, the motivation for not considering such; and 	
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	(xi) a concluding statement indicating the preferred alternatives including preferred location of the activity;	
(i)	<p>a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-</p> <ul style="list-style-type: none"> (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; 	Chapter 7 and 8 Appendix 1
(j)	<p>an assessment of each identified potentially significant impact and risk, including:</p> <ul style="list-style-type: none"> (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated; 	Chapter 7

(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Chapter 7
(l)	<p>An environmental impact statement which contains-</p> <ul style="list-style-type: none"> (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; 	Chapter 9 Appendix 3B
(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapter 7
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 10
(o)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapter 8
(p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the	Chapter 10

	opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Noted. N/A
(r)	<p>An undertaking under oath or affirmation by the EAP in relation to:</p> <ul style="list-style-type: none"> (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; 	Chapter 11
(s)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	Any specific information that may be required by the competent authority; and	Noted. None extra.
(u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	None.

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APPENDIX 8E:	HERPETOFAUNAL STUDY
APPENDIX 8F:	AVIFAUNAL STUDY
APPENDIX 8G:	GEOHYDROLOGICAL STUDY
APPENDIX 8H:	STORMWATER MANAGEMENT PLAN (SWMP)

1. INTRODUCTION

The purpose of this BAR is to broadly and collaboratively identify all possible issues and impacts from activities associated with the proposed 4800 sow unit piggery (from here on known as the “development”). The secondary aim of this project is to identify alternatives in terms of site, design and layout of the proposed development.

The objective of the environmental impact assessment process is to, through a consultative process-

- a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- d) determine the--
 - a. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - b. degree to which these impacts-
 - i. can be reversed;
 - ii. may cause irreplaceable loss of resources, and
 - iii. can be avoided, managed or mitigated;
- e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- g) identify suitable measures to avoid, manage or mitigate identified impacts; and
- h) identify residual risks that need to be managed and monitored.

As part of the project activities identified in the 2014 EIA regulations promulgated on the 4th December 2014, the planning, construction and operation of the proposed low impact industrial development represent the legal trigger for the EIA process to be followed. The listed activities were identified in term of Sections 24 & 24D of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) as amended. The applicable listed activities identified are:

R. 983, 4 DECEMBER 2014- Basic assessment Activities	
Activity No	Listed Activity Description:
4	The development and related operation of facilities or infrastructure for the concentration of animals for the for the purpose of commercial production in densities that exceed: iii) 8 square metres per small stock unit and; a) More than 1000 units per facility excluding pigs where b will apply; b) More than 250 pigs per facility excluding piglets that is not yet weaned.
27	The clearance of an area of 1 ha or more but less than 20 ha of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for - i) the undertaking of a linear activity; or ii) maintenance purposes undertaken in accordance with a maintenance management plan.

1.1 Details of the EAP

The EAP appointed for this project is part of REC Services (Pty) Ltd t/a Rock Environmental Consulting.

<p>REC Services (Pty) Ltd t/a Rock Environmental Consulting</p> <p>601 Rubenstein Drive, Moreleta Park 0044 P. O. Box 40541, Moreleta Park, 0044 Telephone: 012 997 4742 E-mail: rockec@lantic.net & rock.rowan@lantic.net</p>	
<p>APPLICANT:</p> <p>Steynsburg Pork and Abattoir (Pty) Ltd. Mr Michael Tetzlaff PO Box 3060 Randburg 2193 Tel: 082 325 5242 E-Mail: mt@teli.dk</p>	

Rock Environmental Consulting specializes in Environmental Impact Assessments and Management during the planning and development stages of a range of development projects. Rock Environmental Consulting is a streamlined firm with an integrated approach to environmental impact assessments, networking with expertise where necessary, while always keeping a holistic view on assignments.

Our 25 year experience is across a broad range of development projects and clients involved in assignments in the urban and rural environments. Our main client base include road and transport authorities, private land developers, local authorities, farmers, industrial developers, and mining enterprises where we form part of the project team which usually consist of Civil Engineers, Land surveyors, Town and Regional Planners, Property Developers, and Architects etc. Our services include: Basic Environmental Assessments, Environmental Scoping Reports, Environmental Impact Assessment Reports, Environmental Management Programmes, and Environmental Monitoring Reports.

As part of the team at Rock Environmental Consulting is **Mr. Rowan van Tonder**. He is the principle author of this report and works under the supervision of Mr. Pieter van der

Merwe. Rowan undertook his studies at the University of Limpopo and obtained a M.Sc. degree in Botany (focus on Conservation Management) in 2007. Before this, he obtained his B. Hons degree in Physical Geography (focus on Environmental Management) at the University of Pretoria and B.Sc. in Environmental Science at the University of Pretoria. He has been part of Rock Environmental Consulting for 8 years (for extended details, See Appendix 6 - EAP CV).

Mr. Pieter van der Merwe is the managing director for Rock Environmental Consulting. Pieter's responsibilities extend towards reviewing project reports, conducting liaison and participation exercises and using his experience to guide his project team. The coordination of projects and marketing of the company's services also falls within his responsibilities. Pieter obtained his qualifications at the University of Pretoria and includes a BSc. in Botany and Geology, a BSc. Hons degree in Botany (UP) and a BA. Hons degree in Environmental Management (UP for CHE). Pieter has over 25 years of experience in the Environmental Management field and has operated his own company, Rock Environmental Consulting, for more than 14 years.

2. EIA PROCESS FOLLOWED

This assessment will be undertaken in compliance with the National Environmental Management Act 107 of 1998 (NEMA), in accordance with stipulations made in Government Notice R. 982 of 4 December 2014.

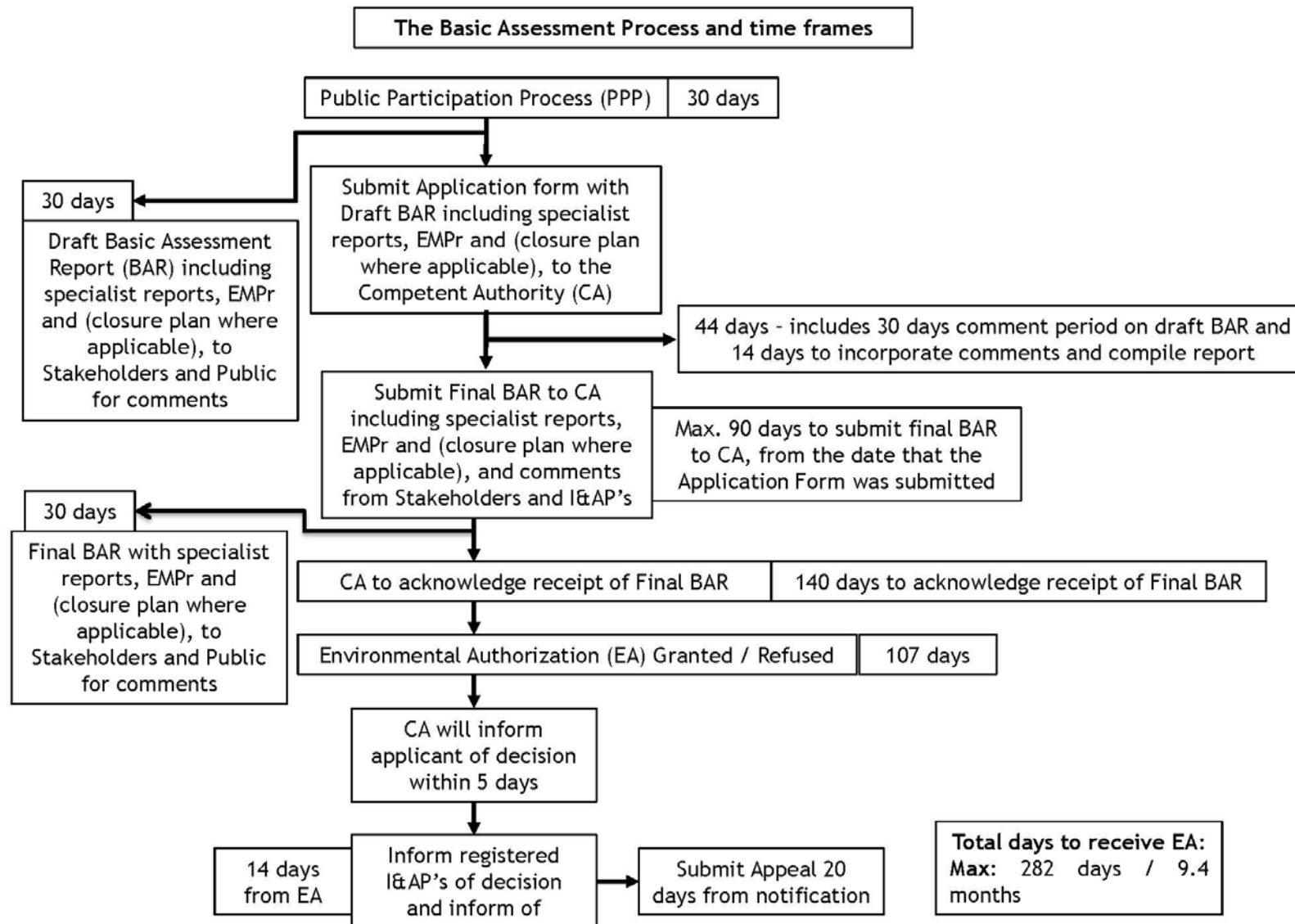
The Environmental Impact Assessment process consists of two main components, namely (i) the technical/biophysical process and (ii) the Public Participation Process.

- (i) The technical process includes, but is not limited to, the following aspects:
 - Terrain investigations;
 - Specialist Studies;
 - The identification and assessment of biophysical elements within the study area;
 - Compilation of a Basic Environmental Impact Assessment Report with Environmental Management Programme.

- (ii) The Public Participation Process includes:
- Compilation of a database of stakeholders and Interested and Affected Parties;
 - Legal notices of the environmental process (press advertisement and on-site);
 - Dissemination of information to stakeholders and I&APs (meetings and open days, if needed);
 - Identification of environmental, as well as social issues and concerns, as raised by I&APs or other relevant stakeholders, and
 - Addressing all concerns raised by I&APs.

The Public Participation Process is conducted in parallel with the total Environmental Impact Assessment process (technical/biophysical process). The Public Participation Process does not aim to promote agreement amongst I&APs or quell possible opposition against a project. The process is made open and transparent to all those involved. Additionally, it is considered important to involve I&APs as early in the Environmental Impact Assessment process as possible, to ensure informed decision-making and effective participation throughout the study.

The Basic Environmental Impact Assessment Process contains the following steps (Gazette notice no. 38282):



2.1 Basic Assessment Process

During the course of this study the following actions and steps were followed which are in accordance with the Regulations set out in Government Notice No. 982 of 4 December 2014 of the NEMA:

- A screening terrain assessment of the physical, historical and biological environmental components of the site was undertaken in order to determine which areas would be most suitable for road widening (i.e. would cause the least impact on the environment).
- An assessment was made of the ecological characteristics of the area which could potentially be affected by the proposed road development.

The Public Participation Process was conducted from 13 to 15 June 2016 and is still in progress.

- Background Information Documents (BIDs) were distributed to adjacent landowners as well as other Interested and Affected Parties (I&APs) from the 13th to the 15th of June 2016 (please refer to Appendix 5A for a copy of the BID as well as proof of the distribution of the BIDs).
- Site notice was erected/placed at the entrance to the property on 13 June 2016 (please refer to Appendix 5D for a copy of the Site Notice as well as proof of the erection of the Site Notice).
- A press advert was placed in the 'Ladysmith Gazette' newspaper on the 17 June 2016.
- The ward councillor (Ward 10), local municipality, Water Affairs and Sanitation and AMAFA was informed by means of Background Information Document (written notification) in this period.
- The anticipated impacts and issues, positive and negative, were identified from I&APs, in order to determine their potential significance and the need for further assessment during the subsequent EIA process which is in progress.

During the course of this EIA assignment the following actions and steps are required and will be followed in accordance with the Regulations set out in Government Notice No. 982 of 2014 of the NEMA:

- An Application for Authorisation, signed by the Applicant, together with a Declaration of Independence, which was signed by the environmental assessment practitioner, will be submitted to the KWAZULU-NATAL DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM & ENVIRONMENTAL AFFAIRS (EDTEA). This will coincide with the submission of the draft Basic Environmental Impact Assessment Report (BAR).
- The Public Participation Process will inform the public about the proposed process and input, comments and suggestions will be requested.
- The draft BAR with an EMPr will be made available for comments to the EDTEA and registered I&APs, the local authorities and all other applicable stakeholders. The draft BAR & EMPr will also be available to be viewed at the municipal library in Bergville
- All issues from the will be addressed in the final BAR & EMPr, as well as issues and impacts identified by the Environmental Assessment Practitioner (EAP). The issues identified in the specialist studies will also be addressed in the final BAR & EMPr.
- The final BAR & EMPr will also be made available to the public for review.
- The final BAR & EMPr will be submitted to EDTEA for review.

Once the EDTEA accepts the final BAR & EMPr, an Environmental Authorisation can be issued.

The BAR & EMPr was made available for comments to the registered I&AP's. Comments received from I&AP's on the contents of the draft BAR & EMPr will be incorporated into the final BAR & EMPr. By making the draft report available, ensures that all issues have been identified.

The following specialist studies were conducted with a set out terms of reference and included into the draft BAR, as well as key environmental issues identified during the

Public Participation Process. The KZN Biodiversity Conservation Plan (KZN CBA Map) (see Appendix 3A for the KZN C-Plan map) also formed a basis and tool used on which the biodiversity assessment was conducted:

- **Vegetation Impact Assessment and Flora study:** A description of the vegetation of the study area, including the identification and assessment of potential Red Data species compiled by **Enviflora (Flora & Avifauna Specialist)**.
- **Fauna Study:** A description of the fauna of the study area, including the identification and assessment of potential Red Data species, compiled by **REC**.
- **Heritage Impact Assessment Report:** A description of the cultural and heritage elements in and around the study site compiled by **Leonie Marais-Botes (Heritage Practitioner)**.
- **Storm Water Management plan:** A plan to manage any water from hard surfaces around and away from the piggery, compiled by **IDS Consulting Engineers**.

3. LEGISLATIVE FRAMEWORK

3.1 National Environmental Management Act 108 of 1998 as Amended

NEMA was promulgated on the 27th of November 1998. The intention of NEMA is to provide for:

- Co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- Institutions that will promote co-operative governance; and
- Procedures for coordinating environmental functions exercised by Organs of State;
- The prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment.

Section 28(1) of NEMA states: “every person who causes; has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”. If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. Steynsburg Pork and Abattoir (Pty) Ltd as the custodians of the site, along with the appointed specialists therefore have a

responsibility, to ensure that the EIA process conforms to the principles of NEMA and that the objective of the EIA process is to identify and assess environmental impacts and to manage these impacts. The final objective is to ensure that this development remains environmentally sustainable.

Table 1: Listed activities triggered in the 2014 NEMA regulations.

R. 983, 4 DECEMBER 2014- Basic assessment Activities	
Activity No	Listed Activity Description:
4	The development and related operation of facilities or infrastructure for the concentration of animals for the for the purpose of commercial production in densities that exceed: iii) 8 square metres per small stock unit and; a) More than 1000 units per facility excluding pigs where b will apply; b) More than 250 pigs per facility excluding piglets that is not yet weaned.
27	The clearance of an area of 1 ha or more but less than 20 ha of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for - i) the undertaking of a linear activity; or ii) maintenance purposes undertaken in accordance with a maintenance management plan.

3.2 National Water Act, 1998 (Act No. 36 Of 1998)

The National Water Act, No 36 of 1998 (NWA) was promulgated on 20 August 1998. The purpose of this Act is to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled.

In terms of Section 19 of the Act owners/ managers/ people occupying land on which any activity or process undertaken which causes, or is likely to cause pollution of a

water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

This Act is relevant to the proposed project as both the construction and operational phases may impact negatively on water resources (for example, streams, rivers, wetlands and groundwater resources).

Steynsburg Pork and Abattoir (Pty) Ltd. is therefore required to take all reasonable measures to prevent any pollution to water resources as a result of the proposed project. Should any pollution occur; Steynsburg Pork and Abattoir (Pty) Ltd. will be obliged to cease the activity that has caused the pollution and remediate any negative impacts resulting from the activity.

Notice is also herewith given in terms of section 21 of the National Water Act, 1998 (Act 36 of 1998) with regards to the application for a Water Use License and/or Registration of the water use activities associated with the proposed development, which includes:

- Section 21(a): taking water from a water resource;
- Section 21(b): storing water;
- Section 21(c): impeding or diverting the flow of water in a watercourse;
- Section 21(e): engaging in a controlled activity (irrigation);
- Section 21(g): disposing of waste in a manner which may detrimentally impact on a water resource; and
- Section 21(i): altering the bed, banks course or characteristics of a watercourse.

3.3 National Heritage Resources Act, 1999(Act No. 25 of 1999)

The National Heritage Resources Act 25 of 1999 (NHRA) was promulgated in 1999 and aims to protect and manage the heritage resources of South Africa. The South African Heritage Resources Agency (SAHRA) is the enforcing authority of this Act and according

to Section 38, a Heritage Impact Assessment (HIA) is required where certain activities are proposed.

The activities that apply to the project include:

- Section 38 (1) (c): any development or other activity which will change the character of a site-
 - exceeding 5 000m² in extent;

3.4 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

The National Environmental Management: Air Quality Act of 2004 was only fully implemented from 1 April 2010, replacing the Atmospheric Pollution Prevention Act No. 45 of 1965.

The Air Quality Management Act aims to:

- Shift focus to the receiving environment in order to protect and enhance the quality of air;
- Provide reasonable measures for preventing pollution and ecological degradation;
- Secure ecologically sustainable development while promoting justifiable economic and social development;
- Decentralize management by shifting responsibilities to provincial and local government;
- Provide baseline air quality characterization by identifying priority areas, pollutants and sources;
- Provide a range of emissions reduction measures through command and control measures as well as market incentives and disincentives;
- Standardize through routine monitoring, information management and reporting; and
- Promote public participation and access to information.

This act is relevant to the proposed project as it may result in higher or lower levels of air pollution (dust and vehicle emissions) in the area, through both the construction and operational phases.

3.5 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), abbreviated as NEMBA.

The objective of the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA), within the framework of NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa;
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing among stakeholders of benefits arising from bioprospecting;

The South African National Biodiversity Institute (SANBI), which was established as a result of the NEMBA, and has the key responsibility of monitoring and reporting on the country's biodiversity and conservation status in terms of threatened and protected species or ecosystems.

SANBI undertook a detailed mapping of South Africa's biodiversity and publish a list of threatened eco-systems. From that a biodiversity conservation plan was created for the KwaZulu-Natal Province. Presently, however, it is considered good practice to conduct Faunal and Floral Impact assessment studies where development projects are to be implemented in or close to sensitive areas. The drainage courses (for example) to be affected by the project are indeed sensitive areas. Therefore, these studies will be conducted during the BAR process. If any negative impacts on biodiversity should be identified, Steynsburg Pork and Abattoir (Pty) Ltd. will take all reasonable measures to limit the impacts.

4. PROJECT MOTIVATION & ALTERNATIVES

4.1 Need and Desirability (Appendix 7)

Need: The South African Pork Producers Organization (SAPPO) and the European Union has issued new regulations to be implemented in 2020. These new laws have been drawn up in conjunction with veterinary services, government and other role-players and compare favourably with International welfare standards.

Desirability: There will be many more additional advantages over and above those numerous items mentioned.

- Ammonia levels and other harmful gases will be reduced through modernized rations, better genetics, and improved facilities.
- Odours will be reduced as we do away with open manure channels, solid flooring. Improved facilities in buildings and handling will minimize odours.
- Flies and others will be greatly reduced as a result of modern designs and minimizing “breeding “places.
- Dust will be reduced as a result of modern feed systems and passaged walkways.
- Noise will be reduced as a result of continuous ‘AD LIB” feed availability and less stress at feeding and other times.
- We are closely monitoring the advent of Pig effluent to biogas to electricity and could well install a biogas plant to greatly reduce odours, to improve effluent quality.

The management teams and employees will have much improved conditions in which to work. Employment opportunities are great during the construction and operation process.

The application has many advantages and it’s been done to be a leader in the field and meet new legislation. It is beneficial to all parties and livestock.

4.2 Properties Affected

Only the current property will be affected.

4.3 Project Description

As per applicant:

All designs are based on the latest SARPO and the European Union's new pig regulations and legislation. We have exceeded these requirements due to our personal objectives of animal welfare and to the environmental responsibilities.

All the buildings and equipment are designed with the above objectives in mind. The pigs will be free at all times except during lactations. This is to prevent the sows from injuring the piglets when they are just born. Once these piglets are strong enough to fend for themselves the farrowing crates will be opened to give the sow more space. The pigs welfare is placed at all time as priority number one.

Each production centre has a special care centre for sick or injured animals. The hygiene in the units is paramount and will be administered to prevent any disease spread. All humans will be required to shower and be disinfected when entering and leaving the units.

The effluent from the units is all organic and will be sold as organic fertiliser and organic liquid. The effluent will be stored under the houses in slurry pits and flushed every 14 days to prevent any ammoniac developing. No water will be required to flush the organic effluent from the buildings. The effluent will be piped to an effluent separation sections to prevent any contact with soil, or the nearby surroundings. The organic solids will be separated from the liquid by means of a separation press. The dry matter will be stored for selling to the surrounding farms and the organic liquid will be stored in a lined dam for fertigation through the nearby centre pivots. The above organic fertiliser will be used on 1200 ha of maize and soya fields

Water will be harvested from all the 65 000 m² roofs for use in the piggery. This will amount to ± 50 000 m³ a year, which is about 40% of the requirement of the farm.

The farm will also make use of solar energy for the heating of all the water for washing purposes. We have also made provision for a biogas plant in the future when it became viable

The production units are as follow:

Site 1	Breeding and Farrowing
Site 2	Weaner and finishers
Site 3	Finishers

The unit is designed considering the following norms:

Sows:

4800 sows 28 weaned piglets per sow a year.

114 days pregnant 28 days in lactation 150 day sow cycle = 2.4 farrowing are per year

Replacing 45/50% sows a year AI with some natural services

Gilt Development:

Breeding stock will be selected at 28 days from the farrowing house and housed in the gilt development nursery. Breeding will take place every 2 weeks with 14/15 sows to supply 100 gilt weaners. This selected stock will be kept in 2 sections for 42 days and then moved to the development section. Breeding stock will be kept in groups of 18 up to 180 days or first heat. These gilts can be served by a V-Boar, or and moved to a gilt pen for 1 to 2 weeks before introduced to the ESF training section for 5/6 weeks. Two week before Insemination 50 gilts will be moved to the AI section to get used to AI crate. Provision is made for 116 gilt crates. By introducing the gilts earlier to the AI crates will improve the conception rate. The gilts will only be kept in crates for insemination. The rest of the time the sow will be free to walk around

The Gilt training section is a part of the breeding house. This section will hold 50/60 gilts in different stages from 180 days to 220 days. Gilts will be kept in pens on arrival from the development section and then moved to a training section to be introduced to the ESF stations. Gilts will be exposed to a boar. The gilts will be in contact with the

detection boar. As they come on heat the gilts will be marked with a colour so that you can identify them. This will assist your stockman as gilts are sometimes difficult to recognise when they come on heat the first time.

This system will then daily select all gilts that are on heat. From here they will be moved to the AI section to be served and introduced into the sow herd. We have made provision for the gilts to be moved to the AI section two week before insemination

Breeding/ AI:

Gilts will be kept in special Gilt AI crates and the sows in sow AI crates. Boar gates are fitted in front of every 7 sows.

Sows will stay in AI section for 7 days and then moved to the early gestation for 35/40 days. In this section the sows can be kept in crates or as free sows by opening the gates. After 35/40 days, and the sows are certified pregnant, they will move to the gestation house. The sows will be accommodated in an open house with the ESF station with 2.3 m² space each. Each sow will be individually fed by the ESF station. The sows can eat at their own time when they are in need of feed. This is an advantage as the sow is protected during feeding and the feed can be altered for the individual sow.

Farrowing:

The sows will be in the farrowing house for 26/28 days. The farrowing house will house 60 sows in 20 rooms on slats with anti-Crushing crates. These crates prevent the sows from crushing the piglets. In the design of the Plantkor sow stall, special attention was given to animal comfort with an optimum sanitation. This reduces the mortality to less than 6% below the norm.

Weaners:

- Weaning on 28 days 7/8 kg;
- 49 days in weaning house with a daily average to reaching +/- 30 kg;
- 3 to 4 % mortality;

- Required temperature is 27 degrees for the first two weeks and reducing by 1 degree per week.

There are 8 rooms with 2800 pig spaces. Each room is divided in 72 pens of which 2 are divided to be used as special care pens. The Ventilation is our unique system that allows us to ventilate up to 70 cub meters of air per weaner in one hour without causing a draught. This is essential in South Africa's hot summer months.

Finishing Pigs:

We have made provision for 1400 pigs per building up to a max of 100 kg live weight. There are 26 buildings with 80 pens of 17 pigs per pen. One pen is divided into two special care pens per building. We have allowed 0, 0,882 m² per pig.

We have made provision for 1 feed line. One silo will be used for the different feeds

Estimate on water use/requirements and slurry production for a 4800 UNIT:

SITE 1 A	Animals	water M ³ /YEAR				M ³ /YEAR	
		Drinking	Total m ³	Cleaning	Total m ³	Slurry	Total m ³
Breeding-Empy sows	296	8	2,427	0	18	2	592
Breeding-Boars	8	5	39	0	0	4	34
Gilts	1,000	4	3,500	0	60	2	2,000
Gestation	3,960	5	19,404	0	238	2	7,920
Farrowing	1,200	7	8,880	5	6,480	9	10,200
Total m³			34,250		6,796		20,746
Month			2,854		566		1,729
Day			95		19		58
Space required 10days			Lt	1,140,173		m ³	576
Prevision		Reserviors	2 x	500,000		20x10x3m	600

SITE 2	Animals	water M ³ /YEAR				M ³ /YEAR	
		Drinking	Total m ³	Cleaning	Total m ³	Slurry	Total m ³
Weaners < 30kg	20,160	1	14,112	0	2,016	1	16,128
Total m³			14,112		2,016		16,128
Month			1,176		168		1,344
Day			39	45	6		45
Space required 10days			Lt	448,000		m ³	448
Prevision		Reserviors	1 x	500,000		20x10x3m	600

SITE 3	Animals	water M ³ /YEAR				M ³ /YEAR	
		Drinking	Total m ³	Cleaning	Total m ³	Slurry	Total m ³

Finishers	31,200	3	78,000	0	6,240	2	49,920
Total m ³			78,000		6,240		49,920
Month			6,500		520		4,160
Day			217	234	17		139
Space required 10days			Lt	2,340,000		m ³	1,387
Prevision		Reserviors	2 x	500,000		30x15x3m	1,350
Totals							
Year		m ³	126,362	m ³	15,052	m ³	86,794
Month			10,530		1,254		7,233
Day			351		42		241
Water							

4.3.1 Locality and Study Area

Proposed development to be established 21 km northwest of Bergville on the Remaining Extent of the farm Steynsburg 7803-GS, KwaZulu-Natal. Entrance to the property is from the R74 right across from the access road to ATKV Drakensville. From Bergville BP filling station, in a westerly direction, on the R74, the turnoff to the farm is about 24.5 km on your left hand side. GPS Coordinate is: 28° 38'09.55"S, 29° 08'33.22"E.

The project will consist of a pig housing complex on sites 1, 2 & 3 plus the manure processing facility and the feed factory. The different piggery complex components and taking into account that the construction footprint is usually somewhat more than it is predicted, the site will cover an area of 15.6 ha. Site 1 will cover in the order of 4 ha; site 2 will cover an area of 1.7 ha; site 3 will cover 7.7 ha; the feed factory and the manure processing plant will cover an area of 3.3 ha.

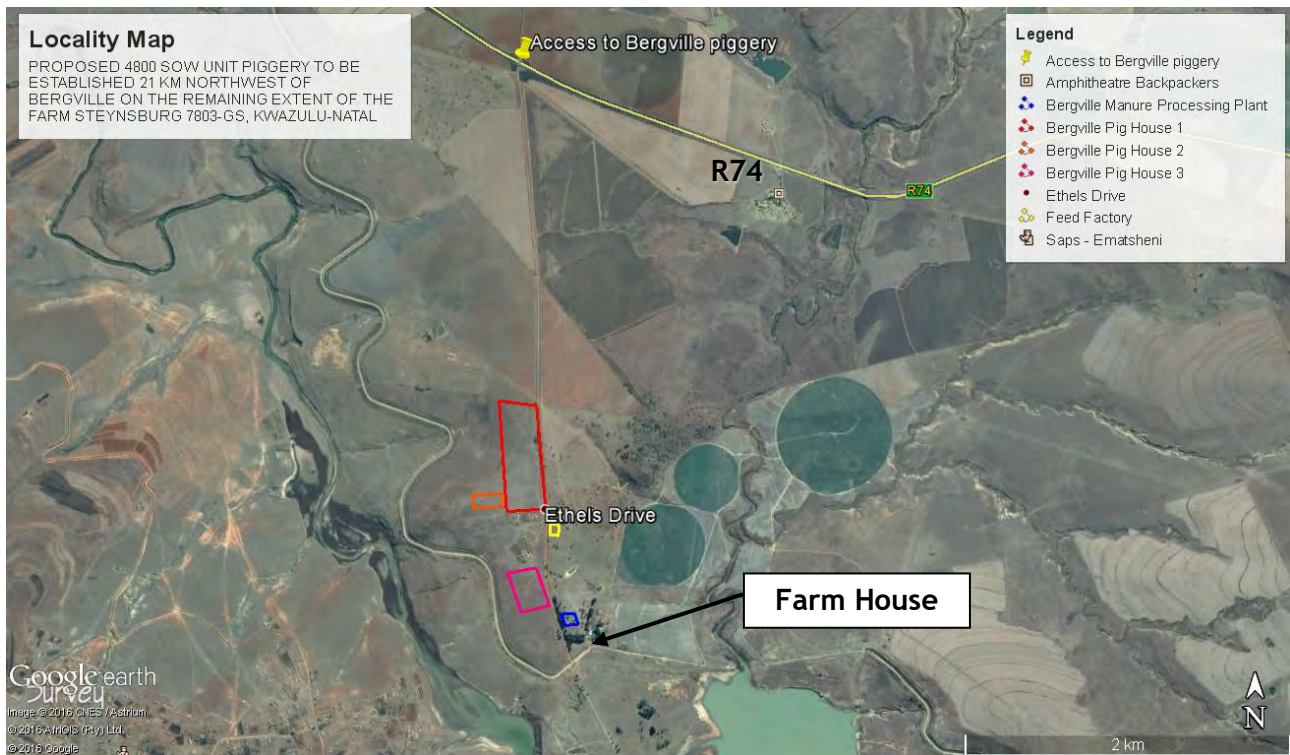


Figure 1: Overview of the study area.

4.3.2 Proposed Alternative

Feasible alternatives can be considered at this stage. The location is a pre-existing property. This is also the only property available to the applicant at this stage. Alternatives in terms of layout could be considered. This will be determined where on the available area the development will have to be placed in the most effective way. The technology to be used and in commercial farming with pigs to this extent and scale i.e. different pig units (climate controlled), manure removal, feeding and watering systems, etc. is of the latest used standards. As a rule this high standards in pig farming technology must be implemented when farming with a 4800 sow unit, and in order to maintain a sustainable market share.

The current electrical power provision is through the normal Eskom network. As an alternative to this part of the technological layout of the facility, the provision of electricity through solar energy generation can be considered as an alternative. This can imply the installation of visible solar panels for partial or self-sustaining electricity provision to the facility.

Table 1 below provides a description based on land use and general environmental characteristics of the study area.

Table 2: Affected Areas of the proposed development.

Adjacent properties	Access	General comments	Key Environmental Issues
<ul style="list-style-type: none"> Recreational, government and agricultural properties all around. 	<ul style="list-style-type: none"> One access from the main R74. 	<ul style="list-style-type: none"> The construction will be on the land portion earmarked for the proposed development. Natural to Disturbed grassland sections will be used for the proposed development. 	<ul style="list-style-type: none"> Vegetation removal. Possible habitat loss. Air pollution due to exhaust fumes and dust. Possible Odour from the development Possible ground water contamination from Pig manure processing facility

4.3.3 Assessment and Considering of Alternatives

Consideration of alternatives is one of the most critical elements of the environmental assessment process. It has its purpose to provide a framework for sound decision-making based on the principles of sustainable development. The search for alternatives should be well documented and should take into account the views of stakeholders. According to the Criteria for determining alternatives as part of the Integrated Environmental Management Information Series, the key criteria for determining alternatives should be practical, feasible, relevant, reasonable and viable.

Right from the onset of the EIA process close examination was given to different activity alternatives. Due to the fact that this area is earmarked for agricultural purposes, only these types of entities can be considered. This was done in conjunction with the applicant & engineer as one has to acknowledge that not only environmental issues need to be taken into account but also to a large extent what will “work” from a business point of view. Layout alternative options, on the area, have very few additional flaws in terms of economic, social and environmental impacts.

In terms of the Public Participation Process, one activity alternative is suggested to the public to take into consideration. This activity alternative was assessed in terms of an

environmental point of view as well as in a socio-economic point of view, as described below.

Activity Alternative (Chicken Egg Laying Facility as appose to a Piggery)

The activity alternative, i.e. Chicken Egg Laying Facility, will have to be in line with similar opportunities for creating jobs for the local community and needs of the local area. This Chicken Egg Laying Facility should accommodate the same developmental aspects that the available land can provide.

Positives	<ul style="list-style-type: none"> • Job creation possibilities; • Economic upliftment for the local area;
Negatives	<ul style="list-style-type: none"> • Same footprint of habitat loss as the Piggery; • Influx of traffic may add to the traffic load of the surrounding road network; • Same possibility of waste generation (effluent and domestic solid waste) to be processed and disposed of as the Piggery; • Crime could rise in the local area due to the influx of more people;

4.3.4 No Go Option

A “DO NOTHING” alternative would be not to use the current property and let it stay natural veld for grazing, as well as for the current farming activities like goats and sheep. On the other hand, no additional job opportunities will be created and no contribution will be made to the upliftment of the community and infrastructure development. Thus, if not developed this positive impact will not be seen.

5. BASELINE ENVIRONMENTAL DESCRIPTION

In order to determine the environmental impacts and to identify possible issues associated with the proposed development, it is necessary to provide baseline environmental information. Resulting from the site investigations and desk studies, as well as discussions with Interested and Affected Parties, the following section provides a description of the environmental conditions and important elements within the study

area. A general assessment, at this stage, of ecological elements does require a bit more detailed floristic sampling and a wetland delineation study for the draft BAR. All the detailed specialist studies will be included in the draft BAR.

5.1 Land Use and Socio-Economics

The larger study area is characterized by recreational & agricultural land use entities. The development falls within the Okhahlamba Local Municipality and in ward 10. Land use will not be impacted upon by the proposed development due to the similar land use being implemented around the property.

According to the Statistics Data 2011 the Okhahlamba Local Municipality has an expanded unemployment rate above 60%; hence job creation is the utmost priority in our endeavour to change to the lives of our people. In creating sustainable employment opportunities, council as resolved to advance the agenda for job creation support for cooperatives and SMME development.

Overview of the Municipality:

POPULATION

Okhahlamba Local Municipality is one of the five municipalities listed under Uthukela District Municipality. Okhahlamba Municipality experienced a negative growth on its population as the population size decreased from 137 924 in 2001 to 132 068 in 2011 recording a -0.43 negative growth (see table below). This decrease in population can be attributed to various factors some of which include migration out of the municipality and the effects of the HIV/AIDS pandemic. This decline in population has significant implications particularly in development related issues. However, it should be noted that the amount of households have increased for the same period from 26 756 to 27 576, which accounts for approximately 820 households. This is thus in contradiction with the decline in population numbers and can possibly be attributed to circular migration, where the head of the household might be working somewhere else and was not counted during the Census.

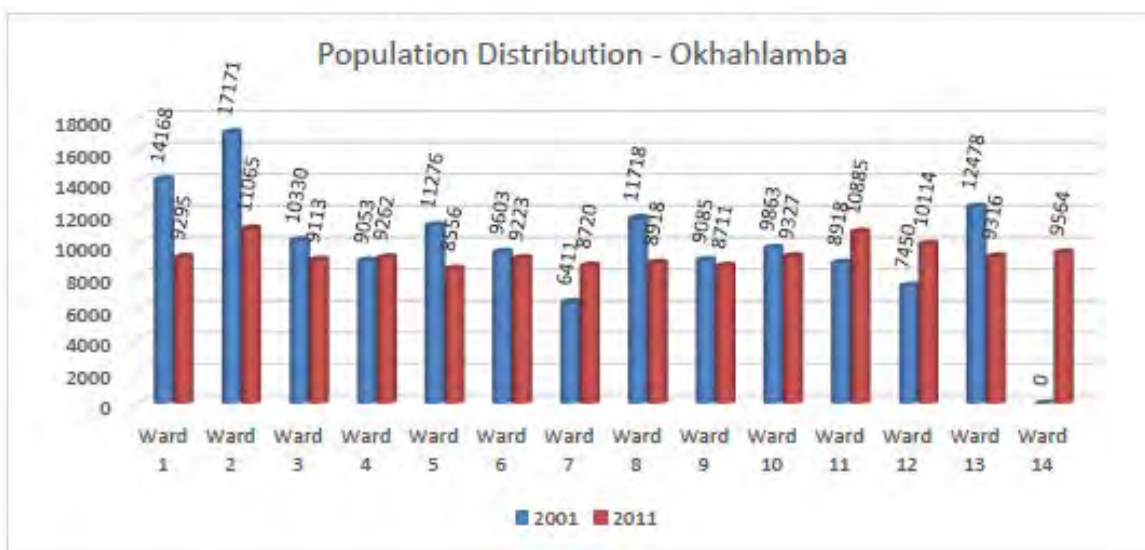
Population of Okhahlamba (2001 - 2011):

Population characteristics	2001	2011
Population Size	137 924	132 068
Population Growth (%)	2.89	-0.43
Number of households	26 756	27 576
Average household size	4.9	4.8
Female headed households	51.2	53.8

Source: Stats SA, Census 2011

Population is unevenly distributed across 14 wards. Figure below depicts ward 2 as the ward, which had the greatest decrease in population over a period of 10 years

Population Distribution per Ward:

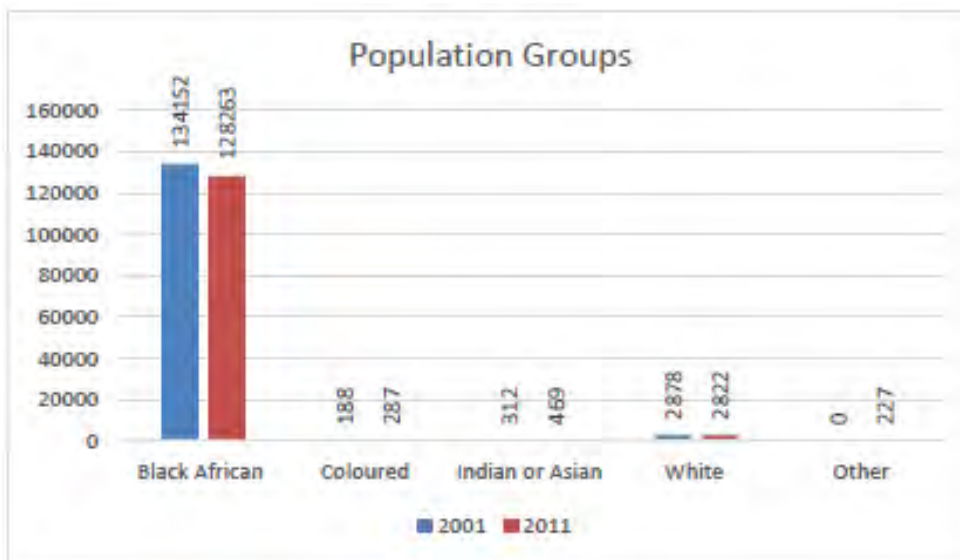


Source: Stats SA, Census 2011

POPULATION GROUPS

Figure below indicates population groups that form the majority of the population of Okhahlamba Municipality. It illustrates that the majority of population is formed by Black Africans and very few from the White population. This graph re-emphasises the decrease that has taken place between 2001 and 2011, however it is shown more specifically that it has been the Black Africans that have decreased in numbers and not so much the White population.

Population Groups:

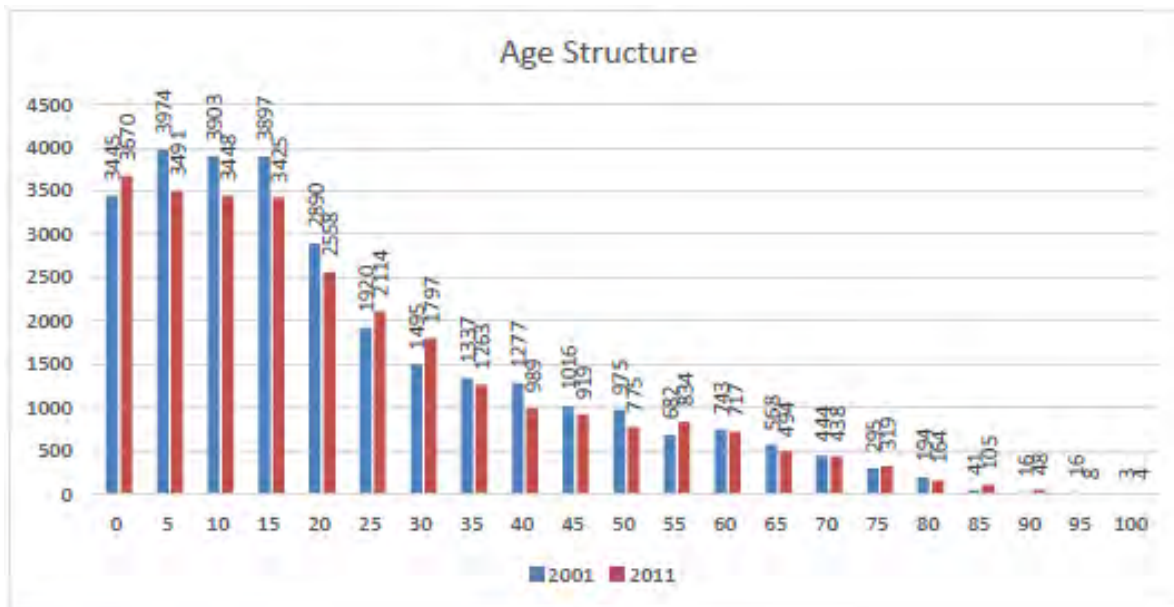


Source: Stats SA, Census 2011

Figure below reflect the age structure of the Okhahlamba Local Municipality. The majority of the population is made up of individuals ranging from ages 0-35 (youth) and little ranging between 64 and 100. In 2001, 41.1% of the population were individuals under the age of 15 and in 2011 there was a decrease in this age group. The 15-64 age group also decreased as in 2001, it represented 54.1% of the overall municipality's population and in 2011 represented 55.9% of the population. The older age group (64<) also decreased from 4.8% to 4.9%. There is thus a decreasing trend identified within each age group.

There are various implication for the trend identified. The Okhahlamba Local Municipality can be characterised with having a large youthful population, which implies the need for various facilities and focus on specific priority areas e.g. educational facilities, economic opportunities and possibly youth development programmes.

Age Structure of Okhahlamba Local Municipality:



Source: Stats SA, Census 2011

5.2 Biophysical Environment

5.2.1 Regional climate

The study area is situated in grassland region, which is located in a more moderate to high temperature region at altitudes of 1100 to 1300 above sea level.

5.2.2 Precipitation

The site falls within the summer rainfall area. Mean Annual Precipitation (MAP) is between 710- 1120 mm. This occurs mainly through summer thunderstorms. Mist occurs frequently on hilltops in spring and early summer, but summer droughts are also frequent (Mucina and Rutherford, 2006).

From November to March the precipitation is at its highest, contributing to 83% of the MAP. The driest month is June & July, with less than 10 mm of rain. The greatest amount of precipitation occurs in January, with an average of 145 mm.

See Fig. 2, for the long-term MAP and temperature occurring in this area using the Agricultural Geo-Referenced Information System (AGIS).

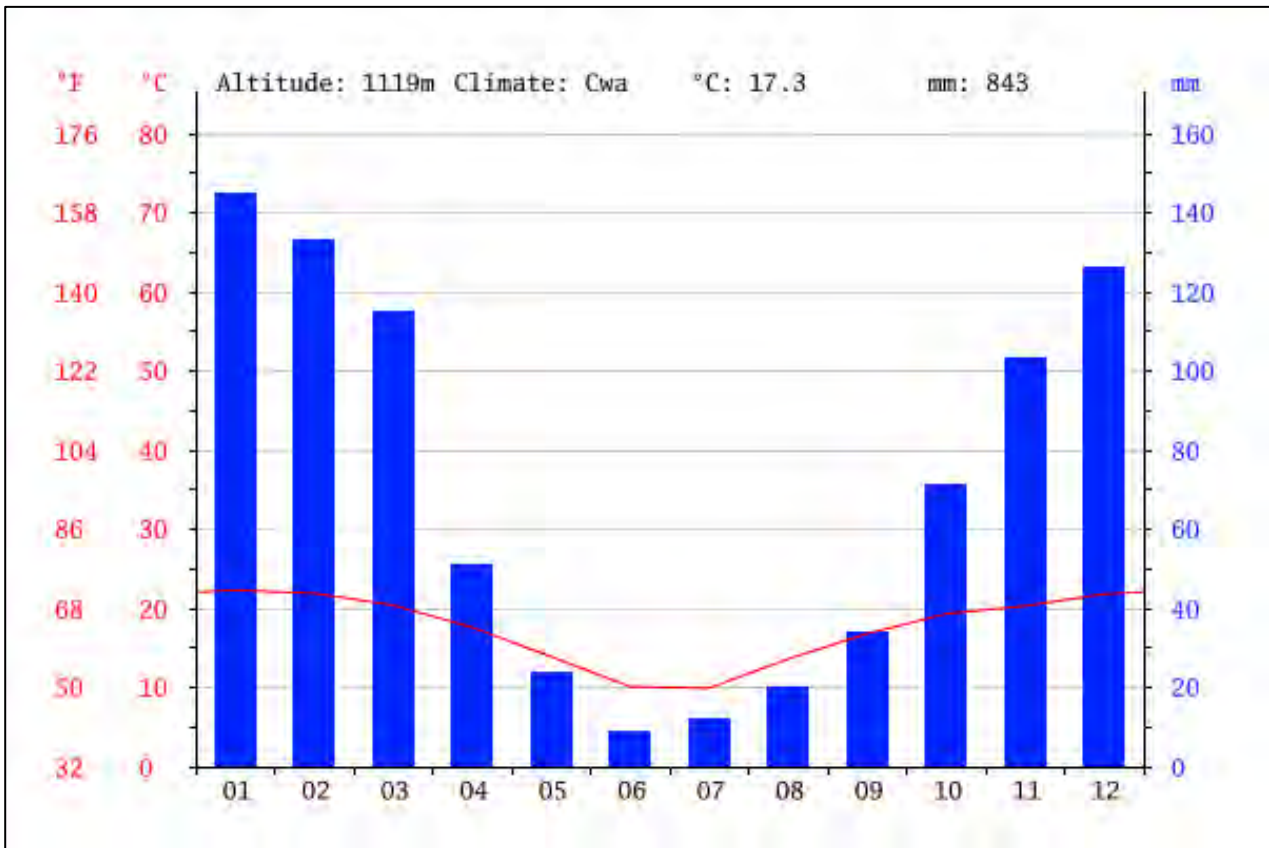


Figure 2: Average rainfall and temperature graph for the region weather station obtained by using the Climate-Data.org System (Climate-Data, 2016).

5.2.3 Temperature

January is the warmest month of the year. The temperature in January averages 22.3 °C. The lowest average temperatures in the year occur in July, when it is around 9.9 °C. (See graphic illustration above for the long-term annual temperatures occurring in this area using the Climate-Data.org System (see Fig. 3)).

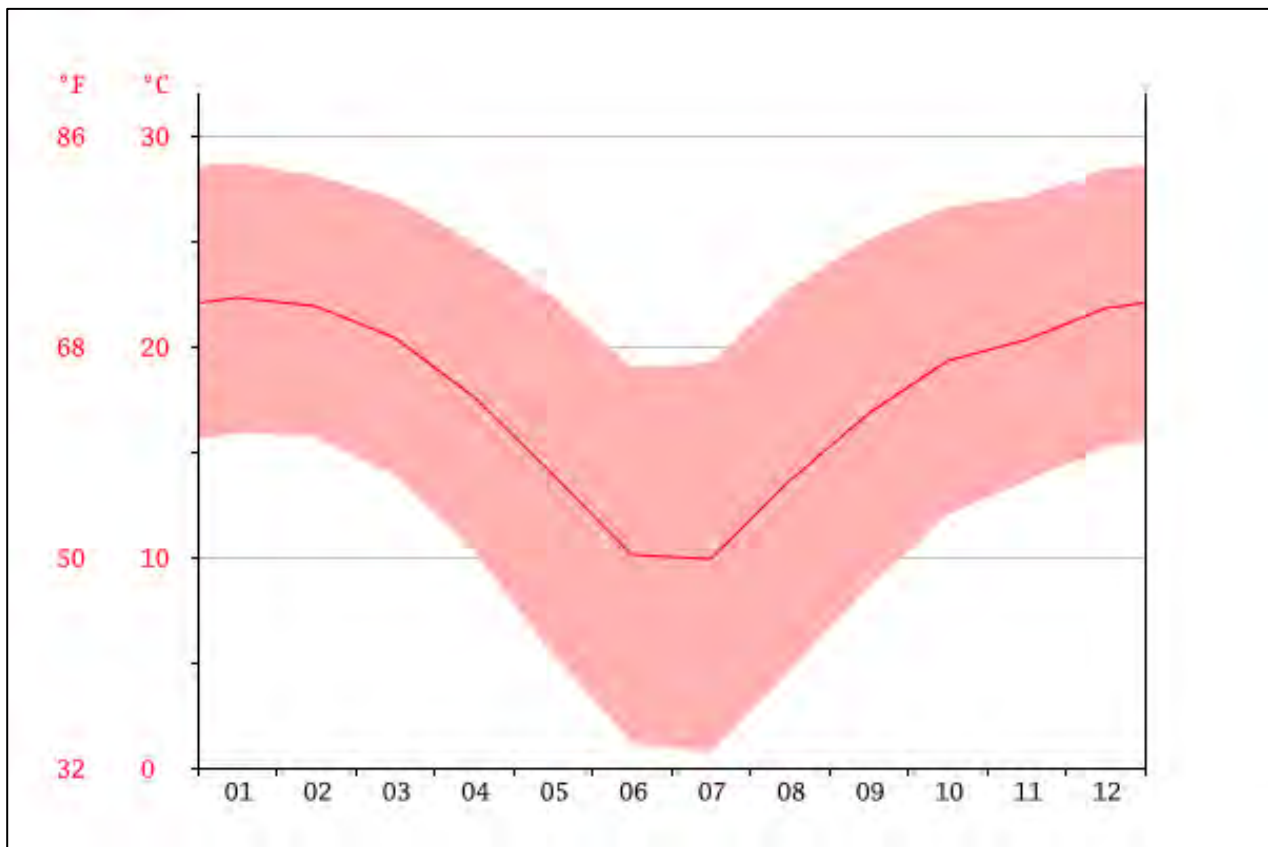


Figure 3: Average temperature graph for the region weather station obtained by using the Climate-Data.org System (Climate-Data, 2016).

5.2.4 Frost

Frost occurs 20 days per year, and can be severe.

5.2.5 Mean Monthly Wind Direction and Speed

No data is available on the average wind speed for the study area. Wind data was obtained for Royal National Park but for variation in wind direction, occurrence and speed is expected to be very similar in the study area. The available wind data, as obtained from the National Weather Bureau - Royal National Park, indicates that the average wind direction and speed are as graphically indicated below:

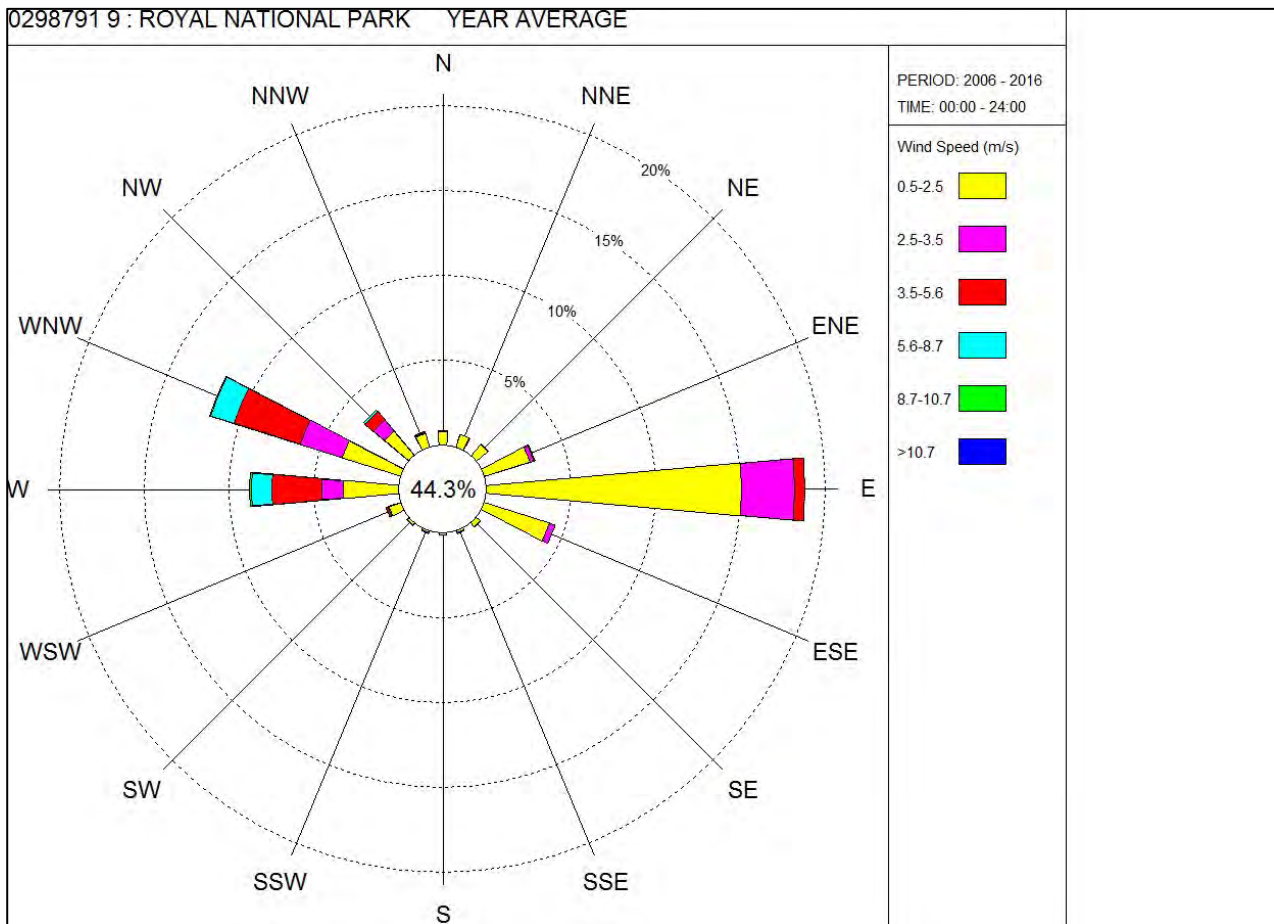


Figure 4: Prevailing wind of the wider region.

The prevailing wind, on a regional basis, is predominantly west, west northwest, and east. Wind speed, on a regional basis, in the region is relatively low with an average of 10.8 km per hour compared to shorter periods of stronger winds of an average of 20.2 km per hour.

The prevailing wind directions for summer and winter are as follows:

Summer: East

Winter: West, West Northwest & East

5.2.6 Topography and Surface Drainage

Sensitive features include the various small wetlands, drainage lines and small dams around the sites.

The 'terrain type' of the area is classified as open low hills or ridges. The terrain contains some distinct topographical sections, namely:

- A small wetland, with small dams, and a drainage line in the eastern part of the property;
- Drainage lines are also found in the western part of the property;
- Farm structures in the central part and southeast corner of the property;
- Northern boundary is bordered by agricultural fields;
- A DWS water scheme canal forming the southern and western border.

The area has a very gentle slope. The site falls within the Thukela - Woodstock Dam Quaternary catchment area (V11D catchment).

5.2.7 Agricultural Potential of the Study Area

The land potential, and specifically the agricultural potential of a site, is determined by the combination of climate, soil conditions and slope prevailing in that region or site, resulting in the classification of areas with similar agricultural land potential. These land potential classes range from "Very High Potential" to "Very Low Potential". The Department of Agriculture has mapped the agricultural potential of South Africa. Using this mapping files, (Agricultural Geo-Referenced Information System [AGIS], as indicated in Fig. 5), it can be seen that the study area as well as surrounding the site, the agricultural potential is rated as moderate potential arable land.

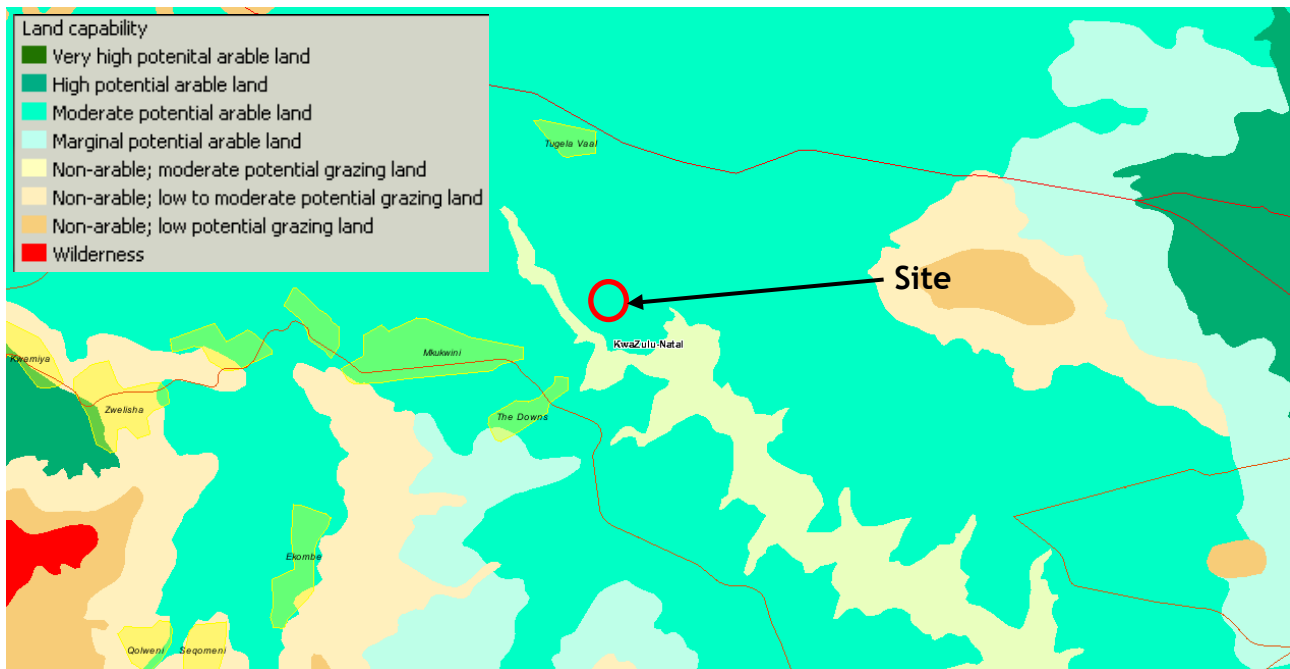


Figure 5: Agricultural potential for the area between Belfast and Cross Roads (AGIS, 2016).

The agricultural activities practiced in the study area are:

- Crop production;
- Livestock farming is prevalent.

5.2.8 Flora of the Study Area

The study area is situated in the Northam KwaZulu-Natal Moist Grassland. It is hilly and rolling landscapes supporting tall tussock grassland usually dominated by *Themeda triandra* and *Hyparrhenia hirta*. Open *Acacia sieberiana* var. *woodii* savannoid woodlands encroach up the valleys, usually on disturbed (strongly eroded) sites. In some places that are not disturbed, only scattered small wetlands, narrow streams alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover.

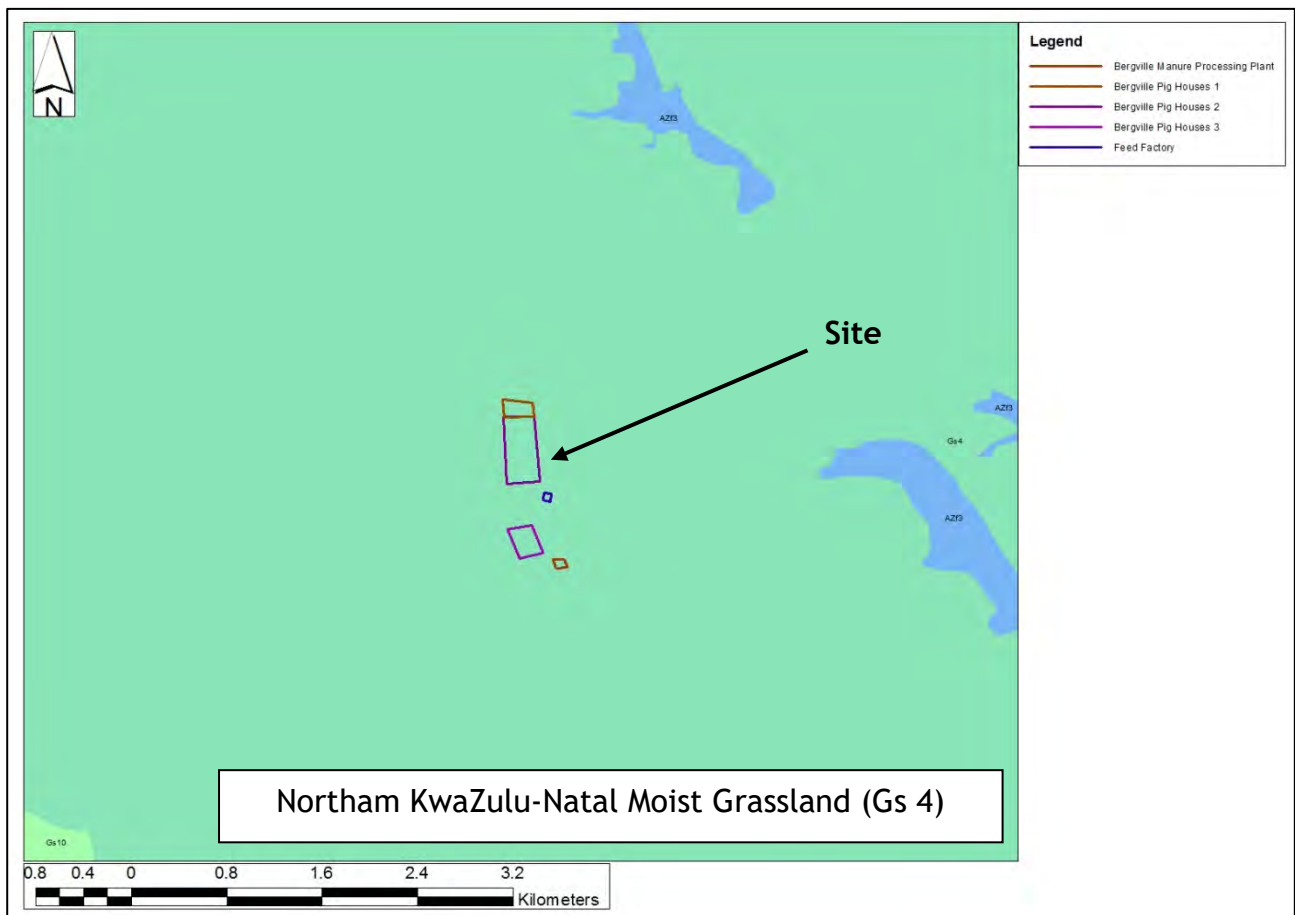


Figure 6: Vegetation type of the study area.

A Threatened species and Species of Conservation Concern list for the Grids 2829CA was obtained from the Plants of South Africa (POSA) database on the South African National Biodiversity Institute (SANBI) website. Threatened species are those that are *facing high risk of extinction, indicated by the categories Critically Endangered, Endangered and Vulnerable*. Species of Conservation Concern include the Threatened Species, but additionally contain the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo *et al.* 2009). However, the POSA list is based on herbarium specimens housed in the National Herbarium of SANBI; therefore many plant species that do occur in the area are not listed.

The following possible red data plant species (by the categories Critically Endangered, Endangered and Vulnerable) could occur in the areas surrounding the study area (according to the POSA database for grid 2829CA):

- *Schizoglossum peglerae* N.E.Br.;
- *Protea subvestita* N.E.Br.

5.2.9 Fauna of the Study Area

The study area is stretched over a relatively large area. No Red Data Book Species were encountered.

5.2.9.1 Mammals of the study area

Possible smaller mammals that would commonly occur in the wider surrounding area are: Chacma Baboon (*Papio ursinus*), Caracal (*Caracal caracal*), Serval (*Leptailurus serval*) and Leopard (*Panthera pardus*). No Red Data Book species were recorded. There are also no records of red data (Critically Endangered, Endangered and Vulnerable) mammals for the wider area (2829CA).





5.2.9.2 Avifauna






According to available literature, approximately 259 bird species occur in the Oliviershoek quarter degree grid cell (2829CA). The following Red Data species were recorded on site or flying over the site:






- Southern Bald Ibis (flying over site);
- Cape Vulture (flying over site); and
- Blue Korhaan (found on site).



According to Barnes (2000) and South African Bird Atlas Project 2, the following bird species are threatened in the wider area:

Table 3: List of possible red date avifauna on or near the site.

SCIENTIFIC NAME	COMMON NAME	IMAGE
<i>Ciconia nigra</i>	Black Stork	
<i>Geronticus calvus</i>	Southern Bald Ibis	
<i>Sagittarius serpentarius</i>	Secretarybird	
<i>Gypaetus barbatus</i>	Bearded Vulture	

SCIENTIFIC NAME	COMMON NAME	IMAGE
<i>Gyps coprotheres</i>	Cape Vulture	
<i>Stephanoaetus coronatus</i>	African Crowned Eagle	
<i>Circus ranivorus</i>	African Marsh-Harrier	
<i>Circus maurus</i>	Black Harrier	
<i>Anthropoides paradiseus</i>	Blue Crane	

SCIENTIFIC NAME	COMMON NAME	IMAGE
<i>Balearica regulorum</i>	Grey Crowned Crane	
<i>Eupodotis caerulescens</i>	Blue Korhaan	
<i>Tyto capensis</i>	African Grass-Owl	
<i>Bucorvus leadbeateri</i>	Southern Ground-Hornbill	
<i>Mirafra cheniana</i>	Melodious Lark	

SCIENTIFIC NAME	COMMON NAME	IMAGE
<i>Lioptilus nigricapillus</i>	Bush Blackcap	
<i>Anthus chloris</i>	Yellow-breasted Pipit	

5.2.9.3 Herpetofauna

No Red Data species was recorded. And no amphibians or reptiles were encountered on site. This might be due to the lack of suitable or specialised searching techniques that is required, as well as the history of anthropogenic activities on site.

Table 4: List of herpetofauna possibly on site or rather found in the wider area:

SCIENTIFIC NAME	COMMON NAME
<i>Cacosternum boettgeri</i>	Common Caco
<i>Cacosternum nanum</i>	Bronze Caco
<i>Strongylopus grayii</i>	Clicking Stream Frog
<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard
<i>Trachylepis varia</i>	Variable Skink
<i>Trachylepis punctatissima</i>	Speckled Rock Skink

5.2.10 Elements of Culture Historical Importance

During the site investigations for the draft BAR stage, focus was also placed on the presence of any stone built structure remnants, ruins, grave sites, monuments, complete

built structures and the presence of artefacts. Based on preliminary observations, stone built structure remnants were found (see pictures below).



A Heritage Impact Assessment, as part of the Environmental Impact Assessment stage of the application process, was conducted by a specialist in accordance with the National Heritage Resources Act (Act 25 of 1999).

The aim of the full HIA investigation will be to identify and assess, if any, heritage features and to recommend heritage management mitigation measures and monitoring programmes aimed at reducing the risks of adverse impacts. This input is to be evaluated by AMAFA. The following findings and recommendations were made by the specialist:

The following sites associated with the Late Iron Age/Early Historical Period were identified in the study area:



Google Earth Image with clear Late Iron Age/Early Historical characteristics (Pig Housing Facility 3)

The study area (Pig Housing Facility 3) does contain archaeological sites and material. The possibility of sub-surface findings always exists and should be taken into consideration.

If sub-surface archaeological material is discovered work must stop and a heritage practitioner preferably an archaeologist contacted to assess the find and make recommendations.

The study area does contain marked graves and burial grounds. The possibility of graves not visible to the human eye always exists and this should be taken into consideration.

It is important to note that all graves and cemeteries are of high significance and are protected by various laws. Legislation with regard to graves includes the National Heritage Resources Act (Act 25 of 1999) whenever graves are 60 years and older. Other legislation with regard to graves includes those when graves are exhumed and relocated, namely the Ordinance on Exhumations (no 12 of 1980) and the Human Tissues Act (Act

65 of 1983 as amended).

If sub-surface graves are discovered work should stop and a professional preferably an archaeologist contacted to assess the age of the grave/graves and to advice on the way forward.

5.2.11 Elements of Visual and Aesthetic Importance

Visual and aesthetic elements of importance has been considered with respect to the proposed development, but will in general not be affected by the proposed activities of this project. No visual and aesthetic important elements are evident on site. This development is situated with in an agricultural setting.

5.2.12 Existing Services and Relocation thereof

None at this stage were identified.

6. PUBLIC PARTICIPATION

6.1 Introduction

A Public Participation Process was conducted as part of the Environmental Impact Assessment process. Stakeholders and I&AP's were given the opportunity to participate in this process and their comments, whether positive or negative, will have to be considered in the evaluation process by the Authorities.

The Public Participation Process aims to communicate to the public or community the potential positive and negative aspects that the proposed development will have on their immediate surroundings in an open and transparent way. The details of the project based on design elements available during the public participation exercise are communicated to the Interested and Affected Parties. The applicant is compelled, to mitigate, where possible, the impacts of the project. Mitigation measures should be implemented considering the practical and feasible means within the framework of the applicant's mandate. Suitable alternatives as identified during the process should also be considered.

6.2 Objectives of the Public Participation Process

The Public Participation Process has the following objectives:

- To inform Interested and Affected parties of the proposed development;
- Provide an opportunity for I&AP's to raise environmental issues/concerns;
- To promote transparency and an understanding of the project and its consequences;
- To serve as a structure for liaison and communication with I&AP's;
- To serve as a data gathering mechanism (of local knowledge);
- To identify issues that can easily be overlooked in the initial stages of planning.

To summarise, the objective of the on-going Public Participation Process is to promote openness and transparency concerning the proposed development, during the life span of the project planning and construction stages. The process should by no means be regarded as a vehicle to temper opposition or objections. Any conclusions agreed upon must be socially, financially and technically acceptable and feasible in order to meet the requirements of both the NEMA and the vision and mandate or responsibility of the applicant, which is Steynsburg Pork and Abattoir (Pty) Ltd. in this instance.

An important and further aim is to identify all I&AP's and remain in contact with them during the EIA process. The Public Participation Process does not terminate at the completion of the public participation phase, but proceeds up to the stage of submission of the draft and final BAR.

6.3 The Guidelines Followed for the Public Participation Process

The Public Participation Process (PPP) for this project was conducted by Rock Environmental Consulting, and undertaken strictly according to the Regulations listed under Chapter 6 of the NEMA.

6.4 Public Participation Process Followed

The following PPP was conducted for the proposed development (in Summary):

- Identification of key Interested and Affected Parties;

- Compilation and distribution of the Background Information Document (BID) to adjacent property landowners. (Please refer to Appendixes for proof of the notifications or process followed for notifying I&AP's);
- Distributing the BIDs to the relevant Officials, such as the municipality and ward councillor and Tribal Authority;
- Compiling proof of delivery of the BIDs;
- Placement of a press notice informing the public of the proposed development in a local newspaper;
- Placement of a site notice;
- Receiving written comments from I&AP's to address in this BAR;
- Correspondence with I&AP's, and addressing I & AP's comments;
- Set up a register of I&APs; and
- Compile a comments and response sheet.

6.4.1 Identification of key Interested and Affected Parties

I&AP's were identified progressively by means of a site visit and consultation with local residents and farmers who are familiar within the area and their neighbours. It is acknowledged that the list of registered I&AP's may be extended as the process proceeds through the EIA process.

I&AP's, and the relevant Authorities were given 30 days to register in response to the Background Information Documents, the site notices and the press advertisement. A register of I&APs have been compiled which can be extended during the EIA process.

I&AP's, and the relevant Authorities, will be given 30 days to comment on the Draft BAR. All the comments, concerns and issues raised by the I&AP's and the Authorities will be considered during this phase of the EIA process which is the BAR.

6.4.2 Compilation and distribution of the Background Information Documents (BID)

The aim of a BID is to provide all I&AP's with a brief description of the proposed development. The BID also contains the details of the proponent and the environmental consultant. Furthermore, it serves as an overview of the PPP. The BID invited the

I&AP's to submit comments and to register. A comment sheet was attached to the BID, which the I&AP's were asked to complete and return to Rock Environmental Consulting if they had any suggestions or comments or issues regarding the project.

Please refer to Appendix 5A & B for copies of the BIDs and for the Acknowledgment of Receipt of the BIDs. Where the BIDs were emailed or faxed to I&AP's (as indicated on the Acknowledgement of Receipt pages), proof of such correspondence can be provided if required by any authority.

6.4.3 Placement of the press advertisement

Please refer to Appendix 5C for a copy of the press notice that appeared in a local newspaper namely The Ladysmith Gazette dated 17/06/2016. Press notices are crucial to create awareness of the project and to reach a broader range of interested and affected parties. Research and enquiries by the EAP indicated that the distribution area of this particular newspaper covers comprehensively the project area / study area.

6.4.4 Placement of on-site notice(s)

The proposed area for development is situated mostly in an agricultural region. Therefore, to inform I&AP's; a site notice was placed at the entrance to the farm. The site notice also provided an opportunity to invite **any interested parties** to register. Please refer to Appendix 5D for copies of the site notice, as well as for the accompanying photographs that serve as proof of the placement of this at the study area.

6.4.5 Public Open Days

One public open day was held on 24 June 2016 between 10:00 and 19:00. The purpose of the public open days was to inform all I&AP's of the proposed development by means of an information session where members of the community or other I&AP's have the open invitation to come and view the conceptual drawings. These person or persons have an opportunity during the open days to gain knowledge of the project, discuss the project and ask questions in an unhindered and transparent manner.

The open days was held at the Bingelela Restaurant B & B (see images below). I&AP's were invited to attend this open day according to the time frames that were given, to view the conceptual drawings, sign the attendance register as an I&AP as well as submit the Comment and Registration Sheet if ready, that was attached to the BID. The applicant was available to explain the technical details and information indicated on the conceptual drawings and to assist in the clarifications of typical issues such as odour control, ground water pollution and security.



The time and venue locality of the open day was advertised in the local newspaper, the site notices, and BIDs. Please refer to Appendix 5G for a copy of the attendance registers of the public open day. Note that I&AP's had the opportunity to register even on and after the public open day. This is a way of communicating the project to Interested and Affected Parties and to gain information on all possible issues.

6.4.6 Placement and Submission of the Draft BAR

The draft BAR was submitted as follows:

Submission date	Receipt date	I&AP or Stakeholder Name	Response in writing
27/02/2017	28/02/2017	Okhahlamba Local Municipality	29 March 2017
27/02/2017	28/02/2017	Okhahlamba Local Municipality: Ward Councillor 10	29 March 2017
27/02/2017	28/02/2017	Public view: Bergville Public Library	29 March 2017

27/02/2017	28/02/2017	KZN EDTEA	29 March 2017
27/02/2017	28/02/2017	AMAFA - Heritage Resources Agency	29 March 2017
27/02/2017	28/02/2017	Department of Water Affairs and Sanitation	29 March 2017
27/02/2017	28/02/2017	REC Website: www.rockeco.co.za	29 March 2017

6.4.7 Feedback from I&AP's throughout the EIA Process

The closing date for registration and comment delivery from I&AP's during the public participation phase was within 30 days from the date of publication of the advertisements, which was 17 June 2016, but public participation is still on-going. Comments were still accepted long after the date that was indicated in all notifications and REC will continue to do so throughout the duration of the project up to the submission of the final BAR. The challenge is to address comments, concerns and issues to the best practical means as most of the issues need special attention by the applicant and engineers as well as all other parties that worked on the project.

The complete list of comments received from I&AP's can be viewed in **Appendix 5F**. The questions and comments received to date are addressed in Annexure 5F. Rock Environmental Consulting (REC) ensured that copies of the draft BAR were available to all I&AP's and Authorities for more of their comments.

Notes were made of all the aspects and issues that were discussed during the public participation phase. All issues will be addressed and where technical matters arise it will be responded to by the engineer/specialist on this project. All comments and responses can be viewed in the comments and response sheet. It was however firmly communicated that only written comments or issues (as per the registration sheet) could be placed on record and responded upon.

A summary of the main comments and concerns received can be viewed below:

- No concerns from the wider public or any other stakeholder were received to date. Except from the dwellers on-site. They at first did not want to be relocated.

6.5 Addressing Written Comments & Questions from the I&AP's

At this stage, no comments have been received, although some people did register via email and the registration sheets. The conclusion is made, for the time being, that the project is received relatively positive by the community in general.

A summary of some the responses from the EAP are shown below (see **Appendix 5F** for the up to date Comments and Response Report):

Comments: From the dwellers on-site via attorneys and ward councillor:

1. What are the dangers of the project?
2. "We like projects because they opened job opportunities and when on our terms in office is completed we hope than even those who will come in after the local municipal elections will take it forward."
3. Negotiations between Okhahlamba Local Municipality and the relevant dwellers already took place.
4. Is there training that will be provided to people who will make the piggery feeds.
5. If the project kick starts, what is the estimate of the employment? The meeting agreed that during the recruitment of people, the recruitment should go across wards 8, 9 and 10.

Response: From meetings held with the ward councillor and their attorneys:

1. No real dangers. Possible noise and odour pollution is foreseen. Surface and ground water pollution is possible if no mitigation measures are in place.
2. Noted.
3. Local dwellers does not want to be relocated, but discussions with their legal representative (Mr Zweli Ngcobo) & Dlundu Attorneys has heeled the following results:

On 22nd of January 2017 meeting with clients & Department officials, to discuss the relocation of dwellers on-site from Steynsburg farm, was held (see Minutes attached to this document).

The following conclusion was reached:

- Rural Development and Land reform to physically measure the current farm to determine how many hectars

- To measure the proposed farm by Investor (79 ha) and households and determine if it's feasible to combine the communities. Must be noted that Five families made it clear that they do not want to combined with unaffected families.
- To identify another farm of similar or bigger size proposed by investors to relocate the families to.
- Innocent, Mr. Xulu and Zweli to visit the proposed farm this coming next week. Farm dwellers have the idea of the farm that they feel it could be suitable for them.
- After the visit, the team amend the proposal and submit to Investors. The letter from the attorneys (see Letter attached to this document) conveyed that: "...In our discussion with clients it appeared that clients are minable to relocate provided that they would relocate to a portion of land which is adjacent to the piece of land pointed out by you and Mr Vickus (farm owner). The proposal presented to them will stand and advised that they would have move from the farm when the houses have been completed. It is further our instructions that before they commit to any agreement the portion of land where they will relocate to be inspected for confirmation of boundaries..."

4. Yes.

5. 50 to 70 new job opportunities.

6.6 Conclusions of the Public Participation Exercise

The proposed development has generally been met with a positive attitude from the community at large. Various issues, if any, put forward by the I&APs, for this project, in the Draft BAR, stage will also be included in the Comments and Response Report (refer to Appendix 5F).

The final BAR report will aim to clarify, consider and sustainably mitigate remaining and significant concerns that the participating I&AP's might have. In conclusion, the public participation exercise has provided, up to this stage, adequate information to enable an understanding of what the proposed development would entail and also to list and address the concerns and comments.

Through addressing all comments and questions received from the I&AP's, and through the compilation of a detailed BAR that was made available for comments, the consultant has attempted to promote a better understanding of the activities of the proposed development. The knowledge and understanding of potential impacts identified at this stage of the application process has been improved.

7. ACTIVITIES, IDENTIFIED IMPACTS AND IMPACT ASSESSMENT

7.1 Introduction and Methodology

This section of the BAR provides a list of the biophysical and social issues that can be expected as a result of the proposed development. Some of the issues are localised in their effects, whilst others could influence a more extensive area. A major aim of the BAR is to identify issues and impacts, with inputs from all the specialists on this project, and to assess the impacts identified.

The identification and descriptions of the relevant physical, biological, socio-economic and heritage issues were conducted under the following headings in Table 5:

- Environmental aspects: defined as those actions on site that may potentially have an environmental impact;
- Environmental component to be impacted upon;
- Locality / applicable zone of the impact; and
- Nature and description of the impact/issue before mitigation
- Nature of the impact/issue after mitigation

An impact significance rating and evaluation, for the listed aspects, forms part of the EIA process. Significant environmental issues have also been identified by means of the relevant environmental legislation, the opinions of specialist consultants and the views of interested and affected parties.

Most of the identified and anticipated negative impacts listed below will only take effect once the construction of the proposed development commences; the main period of

positive impact occurrence is during the long term “operational” phase of the development when it is felt that the broader community will benefit from the project in terms of job creation. The long term negative operational impacts however will also be experienced by the close-by residence in terms of noise and other traffic issues such as access to and from the area.

There are numerous assessment methodologies and approaches within the international sphere of assessing the potential impact of development activities on the environment.

When a particular method for environmental impact analysis is selected or used certain general principles must be kept in mind to avoid the mystique and pseudo-science, which cloud many planning procedures. In general terms an environmental assessment evaluation comprises four main tasks:

1. Collection of data;
2. Analysis and interpretation of this data;
3. Identification of significant environmental impacts;
4. Communication of the findings.

Further to the above the proposed mitigation and management options for the identified impacts must be provided. The selected impact evaluation method must enable these four tasks. Impact methodologies provide an organised approach for predicting and assessing these impacts. Any one methodology and approach will have opportunities and constraints, as well as resource and skill demands, and no one method is appropriate for all South African circumstances. The selected methodologies proposed by this document are appropriate for most South African situations, taking the above criteria into account. Methods whose approach to considering environmental factors is systematic are desirable in an EIA.

Impact assessment methodology should comply with the following set of criteria:

- a. *Be comprehensive*: The environment consists of intricate systems of biotic and abiotic factors, bound together by complex relationships. The methodology must consider the impact on these factors.

- b. *Be flexible*: Flexibility must be contained in the methodology, as projects of different size and scale result in different types of impacts.
- c. *Detect true impact*: The actual impact that institutes environmental change, as opposed to natural existing conditional changes. Long-term and short-term changes should be quantified.
- d. *Be objective*: The methodology must be objective and unbiased, without interference from external decision-making.
- e. *Ensure input of required expertise*: Sound, professional judgement must be assured by a methodology.
- f. *Utilize the state of the art*: Draw upon the best available analytical techniques.
- g. *Employ explicitly defined criteria*: Evaluation criteria used to assess the magnitude of environmental impacts should not be arbitrarily assigned. The methodology should provide explicitly defined criteria and explicitly stated procedures regarding the use of these criteria, including the documented rationale.
- h. *Assess actual magnitude of impacts*: A method must be provided for an assessment based on specific levels of impact for each environmental concern.
- i. *Provide for overall assessment of total impact*: Aggregation of multiple individual impacts is necessary to provide an evaluation of overall total environmental impact.
- j. *Pinpoint critical impacts*: The methodology must identify and emphasize particularly hazardous impacts.

The evaluation of the severity (or significance) of the identified impacts has been done according to a set and objective Significance Rating Methodology, which uses both **quantitative** and **subjective** measures. The framework of this methodology is listed below, which fully explains the rating procedure used and how the construction and operation values given in Table 6 were derived.

7.1.1 Impact Significance Methodology

The **Significance** of Environmental Impacts is to be assessed by means of the following method:

Significance is the product of probability and severity. Probability describes the likelihood of the impact actually occurring, and is rated as follows:

-
- **Improbable** - Low possibility of impact to occur either because of design or historic experience.
Rating = 2
 - **Probable** - Prominent possibility that impact will occur.
Rating = 3
 - **Highly probable** - Most likely that impact will occur.
Rating = 4
 - **Definite** - Impact will occur regardless of any prevention measures
Rating = 5
-

The **severity rating** is calculated from the *factors* given to **intensity** and **duration**. Intensity and duration factors are awarded to each impact, as described below.

The **Intensity factor** is awarded to each impact according to the following method:

-
- **Low intensity** - Nature and/or man-made functions not affected and a minor impact may occur.
Factor 1
 - **Moderate intensity** - Environment affected but natural functions and processes can continue though often in a slightly altered manner.
Factor 2
-

- High intensity
 - Environment affected to the extent that natural functions are altered to the extent that it will temporarily or permanently cease.

Factor 3

Duration is assessed and a *factor* awarded in accordance with the following:

- Short term
 - ≤ 1 to 5 years

Factor 2

- Moderate term
 - 5 - 15 years

Factor 3

- Long term
 - Impact will only cease after the operational life of the activity, either because of natural process or by human intervention.

Factor 4

- Permanent
 - Mitigation, either by natural process or by human intervention, will not occur in such a way or in such a time span that the impact can be considered transient.

Factor 5

The **severity rating** is obtained from calculating a severity factor, and comparing the severity factor to the rating in the table below, for example:

The Severity factor

Intensity factor X Duration factor

$$2 \times 3 = 6$$

A Severity factor of 6 (six) equals a Severity Rating of Moderate severity (Rating 3) as per table below:

Severity Ratings

	FACTOR
Low Severity (Rating 2)	Calculated values 2 to 4
Moderate Severity (Rating 3)	Calculated values 5 to 8
High Severity (Rating 4)	Calculated values 9 to 12
Very High Severity (Rating 5)	Calculated values 13 to 16 and more

Severity factors below 3 indicate no impact

A Significance Rating is calculated by multiplying the Severity Rating with the Probability Rating:

The significance rating should influence the development project as described below:

-
- Low significance (calculated Significance Rating 4 to 6)
 - Positive impact and negative impacts of low significance should have no influence on the proposed development project

 - Moderate significance (calculated Significance Rating ≥ 7 to 12)
 - Positive impact
 - Should indicate that the proposed project should be approved
 - Negative impact:
 - Should be mitigated or mitigation measures should be formulated before the proposed project can be

approved

- High significance (calculated Significance Rating ≥ 13 to 18)
 - Positive impact:
Should points towards a decision for the project to be approved and should be enhanced in final design

 - Negative impact:
Should weigh towards a decision to terminate proposal, or mitigation should be formulated and performed to reduce significance to at least low significance rating.

- Very High significance (calculated Significance Rating ≥ 19 to 25 and more)

7.2 Activities and Impacts Identified, with Impact Assessment

The description and identification of anticipated impacts is based on the listing of **environmental aspects**. Environmental aspects, for the purposes of this document, is the term used to *describe the actions that may have an impact on one or more of the environmental components listed*. It is important to note that aspects that are clearly definable have been used in preference to those that are duplicative, redundant, difficult to measure, and/or obscure.

An impact is defined as *any change in the physical, chemical, biological, cultural, and/or socio-economic environmental system that can be attributed to human activities relative to alternatives under study for meeting a project need*. Therefore, the identified environmental aspects are said to have an impact on the components listed above if they result in change.

One of the most important objectives of conducting and Environmental Impact Assessment is to identify and evaluate these aspects and impacts. Consequently, the

EMPr will consist of the preferred mitigation and management options for the identified impacts assessed as being significant. These will be described within this BAR (and EMPr).

The environmental aspect and the resultant impact can become manifest during the **construction phase (C)** and/or the **operational phase (O)**, which is the stage when the proposed development is complete and fully functional.

The following table provides a list of activities (environmental aspects) that will occur on site and it provides an outline of the potential impacts that these actions will have on the environment, the anticipated effects on the biophysical and social aspects. The identification of the aspects and impacts may be expanded as more information becomes available when the specialist studies are completed. At this stage, the table below provides a list of impacts and issues. Below is an impact assessment of the impacts identified in the Table 5 in relation to the surrounding land-uses.

The identified impacts are rated in terms of their significance during the construction phase and the operational phase of the proposed road. The identified impacts on the physical, ecological and social components of the site are discussed in terms of:

- Vegetation component of the site;
- Faunal component of the site;
- Possible impact on Red Data Fauna and Flora;
- Soil surface (stability);
- Topsoil layer (disturbance and compaction);
- Subsurface soil quality;
- Topography;
- Geology;
- Surface drainage and existing water bodies (wetland within the study area);
- Surface water run-off (quality);
- Groundwater resources (quality);
- Air quality (due to dust generation);

- Ambient noise levels;
- Cultural historical elements;
- Social environment (of adjacent landowners);
- Traffic safety aspects (safety of the community);
- Land use options and agricultural potential of the site;
- Visual and aesthetic quality;
- Local economy (due to job creation); and
- Impact on the community (due to provision of affordable electricity).

It should be noted that the impact significance rating is given presuming that no mitigation measures are to be implemented during the construction or operational phase of the project (this would imply a worst case scenario).

Table 4: List of activities (environmental aspects) that will occur on site, the potential impacts that these activities may have on the environment and a description of the nature of the impact (c: construction stage; o: operational phase). The impacts rated, at this stage of high importance, are marked with a red triangle Δ ; leaning towards high significance impact.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Vegetation clearance for the footprint of the proposed development (C). Clearance of vegetation in the establishment of infrastructure (C)	Soil layers, soil surface, indigenous vegetation cover.	On-site.	The removal of vegetation cover, such that the soil surface is exposed, may lead to increased soil erosion in certain areas. The existing vegetation will be permanently removed to accommodate the footprint of the development. Where the removal of surface vegetation is of a temporary nature only, the establishment of weeds is a threat. The topsoil layer is required to rehabilitate the area (i.e. for landscaping the area). Δ	It is advisable that only vegetation be removed where and when it is necessary. After removal of vegetation, landscaping needs to be incorporated by re-establishing natural grassland/vegetation where appropriate. No red data plant species were recorded during the site visits conducted. Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 5x3=15 This impact is of negative high significance before mitigation.</p>	
Stockpiling of excavated material (C)	Soil and vegetation cover.	<p>Precise location still to be determined; the impacts on soil and vegetation will occur wherever stockpiles are established.</p> <p>Wherever possible, the stockpiles should be placed in non-sensitive areas.</p>	<p>Stockpiles cause compaction of the soil, which promotes the establishment of weed species. The establishment of weeds greatly reduces the pristine quality of the natural vegetation on site.</p> <p>Stockpiles should not be situated within 200 m from any water bodies or water courses, as sedimentation transport into such systems is undesirable.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3)</p>	<p>Stockpiles must not exceed 2 metres in height. Stockpiles must be used for filling material as the re use of stockpiles cannot be done on the road. By using the stockpiles as filling material for the sides, vegetation growth can be promoted by the seeds still contained in the topsoil layer.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>This impact is of negative <u>low significance</u></p>
Stockpiling building materials (C)	Soil and vegetation cover.	The impact is of a localized nature.	<p>Stockpiles will need to be established for the storage of aggregate, bricks and cement. As mentioned, stockpiles cause compaction of the soil surface, which leads to the growth of unwanted weed species.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Building material stockpiles must not be stockpiles within any of the riparian areas. Any alien vegetation that established itself because of disturbance need to be eradicated.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Water use for construction	Use of ground water resources is possible but	On-site.	The use of water as an important resource must be assessed carefully	Water will most likely be sourced from boreholes. Possible

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
<p>purposes of the development.</p>	<p>is it anticipated that NO natural surface water sources would be used. A WULA is being conducted in this regard. WULA will concentrate on this proposed development due to:</p> <ul style="list-style-type: none"> • Section 21(a): taking water from a water resource; • Section 21(b): storing water; • Section 21(c): impeding or diverting the flow of water in a watercourse; • Section 21(e): 		<p>and a statement should be made on the impact once it has been established what the source of the water for construction purposes will be. The WULA is also necessary as mentioned. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16</p> <p>This impact is of negative high significance before mitigation.</p>	<p>significance assessment on ground water resources would be of moderate significance, because it will most likely come from underground resources.</p> <p>Probability = 4 (highly probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 4x3=12</p> <p>This impact is of negative <u>moderate significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
	<p>engaging in a controlled activity (irrigation);</p> <ul style="list-style-type: none"> • Section 21(g): disposing of waste in a manner which may detrimentally impact on a water resource; and • Section 21(i): altering the bed, banks course or characteristics of a watercourse 			
<p>Installation and operation of <u>temporary sewerage systems</u> for construction workers.</p>	<p>Soil layers, vegetation cover and groundwater.</p>	<p>Very localised and of a temporary nature.</p>	<p>The placement of chemical toilet systems and the servicing thereof will not have an impact on the environment, if operated according to requirements. Temporary toilets left unmanaged can leak raw</p>	<p>Temporary toilets need to be managed and serviced on a regular service schedule. This schedule has to be recorded and controlled by the contractor on site. Regular disposal of waste need to be done</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>sewage and effluent into the soil, surface and even ground water sources. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>by a contracted disposal company. No temporary toilets will be allowed within 100 metres from any of the drainage lines.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Provisions for storm water i.e. storm water drainage (C)	Soil surfaces, vegetation cover and drainage patterns.	Areas where surface water run-off is collected i.e. like from compacted surfaces, gutters and structures, as well as road surfaces.	Poorly implemented storm water system will result in increased surface run-off volume and speed, which could lead to the creation of erosion gullies. Storm water must be allowed to spread out gradually over a large surface area to protect the soil surface against erosion.	Storm water outlet designs have to be done and construction undertaken within the correct design documents from the civil engineer. Vegetation cover needs to be established on bare soil areas to prevent erosion due to storm water.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Inadequate designed storm water outlets can lead to flooding of the road surface, adding unnecessary volume to effluent dams which is dangerous.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
Maintenance of storm water management systems (O)	Soil surfaces, drainage patterns and surface water.	In all areas where storm water management systems have to be created.	Storm water management will particularly be important with careful design eminent at the crossing of any natural drainage ways. Storm water outlets can get blocked due to debris and other substances that are washed from	Maintenance of storm water outlets is required to ensure that they don't get blocked (i.e. no longer fulfil their function) or result in erosion. The custodian of the development has to perform regular checks and maintenance.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>the hard surfaces. This includes siltation due to soil erosion.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Excavations in general	Potential impact on elements of cultural or heritage importance.	Localised if these may occur	<p>Possible archaeological impacts are confirmed in the Heritage report. It is possible that historical important items or graves could be uncovered if construction commences. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4)</p>	<p>If any artefacts, graves or articles of historical importance are found during construction, the construction activities have to be stopped and the area fenced off. A heritage consultant will have to be appointed to take any further related steps such as relocation.</p> <p>Probability = 3 (improbable)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
<p>Generation of construction waste (C)</p>	<p>Soil, vegetation, aesthetic quality of the site and surface water run-off, water and ground water resources.</p>	<p>All construction sites and directly adjacent areas within the development.</p>	<p>Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly. Further to littering the site and adjacent areas, poor control and illegal dumping of construction waste can pollute surface water run-off, as well as lead to the promotion of weed species. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term)</p>	<p>Building rubble has to be collected at a centralized area and preferably in skip waste bins. No illegal dumping may be allowed in the construction phase and this will have to be checked and monitored by the appointed Environmental Control Officer.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			Severity = $4 \times 4 = 16$ (rating 4) Significance = $4 \times 4 = 16$ This impact is of negative high significance before mitigation.	This impact is of negative <u>low significance</u>
Site maintenance (O)	Vegetation and soil surface conditions, as well as social well-being of the residents of the area.	The site need to be maintained.	Poorly maintained storm water drainage structure will cause abnormal soil erosion at outlets. Therefore, site & road maintenance is essential. Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = $2 \times 4 = 8$ (rating 3) Significance = $3 \times 3 = 9$ This impact is of negative moderate significance	Site & road maintenance is essential and is the responsibility of the property owner in the operational phase. Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = $2 \times 2 = 4$ (rating 2) Significance = $3 \times 2 = 6$ This impact is of negative <u>low significance</u>
Collection and disposal of solid construction waste	Aesthetic quality, surface water run-off, subsurface and	The site and directly adjacent areas.	Poor waste collection and handling will pollute the environment (affecting fauna, groundwater,	No illegal dumping of domestic and construction related waste should be tolerated. Domestic

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
(C)	groundwater quality, vegetation and fauna.		<p>surface water and aesthetic environment).</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>construction waste has to be collected into central waste skip disposal units.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Traffic movement (C)(O)	Noise levels around the development due to the movement of additional traffic.	Noise impact of a local nature along the developments. Closer community.	<p>The movement of traffic (during construction and operation) around the development will have an impact on the ambient or prevailing noise levels.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term)</p>	<p>Noise mitigation measures are required in order to keep the noise generated by construction activities as low as possible. This can be achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example,</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance.</p>	<p>poor maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as construction outside of these time frames will be a nuisance to adjacent dwellers. On operational phase the general business day noise will be the same as for the surrounding properties.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Temporary employment created during the construction phases of the proposed development(C)	Social aspects	All sites where construction related activities are to take place.	There will be positive impacts in terms of social upliftment and job creation within the broader region.	
Transportation of workers to and from the development site (C)	Air quality, soil surface and social aspects (including traffic and worker safety).	The road safety of the region. A local issue.	<p>Vehicles used to transport workers can be overloaded; worker safety is of utmost importance. Vehicles used to transport workers which exceed the speed limit are dangerous.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative</p>	<p>Traffic safety measures have to be implemented by the contractor. Correct signage and safety clothing needs to be in place. Construction workers need to be transported to and from the site on a safe manner.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			moderate significance	<u>significance</u>
Construction camp establishment (C)	Aesthetic impacts, social aspects, subsurface and groundwater quality, generation of domestic waste, vegetation removal, soil surface compaction and faunal impacts.	Location still to be determined.	<p>The generation of domestic waste, as well as the provision of sewage facilities, within the construction camp could potential impact on the aesthetics of the site as well as the quality of subsurface and groundwater if not properly managed and implemented. The removal of sections of natural vegetation would most likely be needed for the establishment of the camp, and soil surfaces would become compacted as a result of activities within the camp.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3)</p>	<p>Proper management of any temporary toilets need to be undertaken on a strict schedule. The construction camp must be more than 100 metres away from any water bodies. Construction camps.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Significance= 3x3=9 This impact is of negative moderate significance</p>	
<p>Housing of workers during construction (C)</p>	<p>Aesthetic character, soil and vegetation, surface water quality and social aspects.</p>	<p>The possibility of housing construction workers on site.</p>	<p>The establishment of housing for workers will have a localised impact on the soil and vegetation cover of the chosen site, as well as potentially having a negative impact on the quality of surface water - as a result of domestic waste, and sanitation facilities for example, if these are not properly addressed. Safety is also a concern to residence and stay of workers on site should not be encouraged.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3)</p>	<p>Housing of workers on site, at the construction camp, is a possibility. Preferably only security should look after equipment at night time hours. If workers are housed near residential areas it could create a safety concern.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Significance= 3x3=9 This impact is of negative moderate significance</p>	
<p>Sanitation provision to workers during the working day (C)</p>	<p>Subsurface soil, surface water and subsurface water quality.</p>	<p>Insufficient chemical toilets will have a health impact locally.</p>	<p>Insufficient chemical toilets will have a health impact. Subsurface soil contamination and contamination of surface / subsurface water quality could occur if the ablution facilities provided are not according to standard. A temporary impact is possible; however, it can easily be prevented.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative</p>	<p>Sufficient chemical toilets should be provided for workers, in the range of 1 per every 8 workers, within walking distance of all construction activities. These toilets must be well maintained and inspected on a daily basis to ensure that they are clean and functioning properly. No washing of people and/or goods should take place on cleared surfaces, as this water should not be allowed to drain into any adjacent storm water canals or drainage lines.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>moderate significance</p>	<p>Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
<p>Movement of construction vehicles on site (C)</p>	<p>Air quality, soil and vegetation cover.</p>	<p>Potential impacts may be eminent over a wide area if not carefully managed and restricted.</p>	<p>Movement will cause limited or localised disturbances and temporary soil compaction, which promotes the establishment of weed species. Dust will be generated by vehicular movements on site.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Alien plant species need to be controlled and it must be ensured that weeds are removed. Dust depression measures such as watering the bare surfaces need to be implemented.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Maintenance of construction vehicles (C)	Soil, vegetation and surface water.	Within the construction camp(s).	<p>In the event of on-site repairs and servicing, soil surfaces, vegetation, and run-off may be locally contaminated. Spillage of fuel through faulty bowser is a possibility, if not controlled. It is anticipated that fuel storage facilities will occur on the site. If poorly installed or managed it will cause pollution.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>The construction camp has to be identified and communicated to the ECO as soon as its position is available. Any fuel depot areas have to be bunded and where fuel hoses will operate, absorbing gravel needs to be provided. This area can also be lined with a small piece of plastic below the gravel. As soon as any spillages occur, the gravel has to be collected and disposed of as hazardous waste.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Traffic safety on the main roads (C and O)	Social aspects.	At all places where there will be interaction with the local traffic along existing routes as well as traffic moving through the area.	<p>Motorists using the main roads and alternative roads may be negatively impacted on by slow moving construction vehicles.▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>Traffic safety measures have to be implemented to ensure that the general public is safe. Adequate traffic signage has to be implemented where any heavy vehicles will cross the main roads. Adequate clothing that is visible should be provided to the workers.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>
Noise generation by operating air compressors, excavators and	Impacts on faunal surrounding land owners.	Areas on and surrounding site at which construction activities take place.	Excessive noise levels on site may negatively impact upon the behaviour and movements of site fauna. Surrounding land owners may	Noise mitigation measures are required in order to keep the noise generated by construction activities as low as possible - given the site's

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
<p>other heavy machinery. Noise is also generated by the construction workers (C)</p>			<p>also potentially be negatively impacted upon by excessive noise levels on site during construction. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>relatively close proximity to some residential areas. This can be achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example, poor maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as construction outside of these time frames will be a nuisance to adjacent dwellers.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
				<p>Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>
Heritage (C)	Heritage or historical components	Historical features are present on site.	<p>The proposed development is to be conducted near or on possible cultural historical elements. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>If any areas of historical significance are discovered during construction, work should be stopped and a cultural specialist should investigate the site. The first contact can be made with the EAP on site.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Impact on the wetlands (C) (O)	Water quality, and soil	In and around the wetland areas.	Impacts on the wetland could be caused by the construction activities and possible siltation into the wetland, although no construction will occur in any wetlands. ▲ Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u>	Please refer to Pg. 108 under section 8.3.1.1: Mitigation measures. This was formulated by the aquatic specialist. Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u>
Movement and survival of Animal species	Fauna of the site	Within the site	The construction will have an effect on the animals present within the site. These impacts will include habitat destruction. It will also limit movement of species through the site.	Specialist studies have determined an overview of the habitat present on-site. Red data avifauna have been recorded during the EAP's site visit.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>
Construction of the proposed development on red data animals	Animals	On-site	<p>The construction of the proposed development will influence animal life and habitat. Red data avifauna species were recorded during the site visits. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high</p>	<p>Although habitat will be lost, proper rehabilitation of the site, not used, could lessen the severity of the impact.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			significance before mitigation.	

8.2.1 Summary of the Significance Rating of the Anticipated Impacts

ENVIRONMENTAL AND OTHER COMPONENTS TO BE AFFECTED BM = before mitigation AM = after mitigation	Probability value	Intensity value	Duration value	Severity value	Significance rating
Impact on the vegetation component of the site	BM: 5 AM: 3	2 2	4 2	3 2	15: High (negative) 6: Low (negative)
Impact on the faunal component of the site	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on Red Data Fauna and Flora	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on soil (surface stability)	BM: 3 AM: 2	2 1	2 4	2 2	6: Low (negative) 4: Low (negative)
Impact on soil (topsoil layer - disturbance and compaction)	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on subsurface soil quality	BM: 2 AM: 2	2 2	2 4	2 3	4: Low (negative) 6: Low (negative)
Impact on topography	BM: 2 AM: 0	2 0	2 0	2 0	4: Low (negative) 0
Impact on geology	BM: 2 AM: 0	2 0	2 0	2 0	4: Low (negative) 0
Impact on surface drainage and existing water bodies	BM: 4 AM: 4	2 2	4 2	3 2	12: Moderate (negative) 8: Moderate (negative)
Impact on surface water run-off quality	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on groundwater resources	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on air quality	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on ambient noise levels	BM: 4 AM: 2	4 2	4 2	4 2	16: High (negative) 4: Low (negative)
Impact on cultural historical & archaeological elements	BM: 4 AM: 3	4 2	4 4	4 3	16: High (negative) 9: Moderate (negative)
Impact on the social environment of the adjacent landowners	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on traffic safety aspects	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on land use & agricultural potential	BM: 2 AM: 2	2 2	2 2	2 2	4: Low (negative) 4: Low (negative)
Impact on visual and aesthetic quality	BM: 2 AM: 2	2 2	2 2	2 2	4: Low (negative) 4: Low (negative)
Impact on local economy (due to job creation)	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (positive) 4: low (positive)
Impact on community (due to job creation)	BM: 2 AM: 2	1 1	2 2	2 2	4: Low (positive) 4: Low (positive)

8.3 Cumulative Impacts

According to the definition in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Cumulative impact on other physical components such as natural vegetation and animal life, air quality and visual impact is regarded at this stage as of moderate significance, due to the out stretched and spacious nature of the landscape and the proposed development will tie in to the current infrastructure and natural lay of the land of the area; possible secondary waste or pollution is predicted.

The possible cumulative impacts foreseen will be the loss of natural habitat, possible pollution into the natural environment. All impacts from the construction phase of the development should be continually mitigated. Thus potentially no high significant cumulative impacts are predicted.

Table 5: The possible cumulative impacts from similar developments connecting to this development.

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
Vegetation clearance for the footprint of the development (C).	Soil layers, soil surface.	Seen at a wider scale the additional development and secondary developments are physically not connected, but the removal of vegetation cover, such that the soil surface is exposed,

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		<p>may lead to increased soil erosion in the area. Where the removal of natural vegetation is small in percentage to the whole activity it may add to a bigger combined loss of natural vegetation in the local area.</p>
<p>Excavations for the foundations of the development (C).</p>	<p>Soil layers and faunal habitat.</p>	<p>The existing natural vegetation will be permanently removed to accommodate the foundations of the necessary structures.</p> <p>Very little faunal habitat will also be affected in combination with the surrounding developments.</p> <p>Soil layers affected will be a localised impact and not cumulative.</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
Stockpiling of excavated material (C)	Soil and vegetation cover.	Stockpiles cause compaction of the soil, which promotes the establishment of weed species. This impact is of a temporary nature and not cumulative.
Stockpiling building materials (C)	Soil and vegetation cover.	Stockpiles will need to be established for the storage of aggregate, concrete infrastructure and cement, etc. As mentioned, stockpiles cause compaction of the soil surface, which leads to the growth of unwanted weed species. This impact is of a temporary nature and not cumulative.
Provisions for storm water i.e. storm water drainage (C)	Soil surfaces, vegetation cover and drainage patterns.	Correct and efficient storm water drainage systems must be installed. Poorly designed storm water outlets will result in increased surface run-off volume and speed, which could lead to the creation of erosion

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		<p>gullies. All hard surfaces generate storm water, which should be controlled by preventing the storm water from crossing the road. Storm water must be allowed to spread out gradually over a large surface area to protect the soil surface against erosion. The surrounding developments may contribute to more erosion due to more cleared and open surfaces found at these developments.</p>
<p>Generation of construction waste (C)</p>	<p>Soil, vegetation, aesthetic quality of the site and surface water run-off, water and ground water resources.</p>	<p>Waste, such as building rubble and empty cement bags can be a greater negative visual impact, with the additional construction waste of the staff courters, if not collected and disposed of correctly. Further to littering the site and adjacent areas, poor control and illegal dumping of</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		<p>construction waste can pollute surface water run-off, as well as lead to the promulgation of weed species.</p>
<p>General maintenance (O)</p>	<p>Visual quality, also surface water quality and vegetation cover.</p>	<p>The design and nature of the proposed development will determine the impact of the proposed development on the visual quality of the study area. Maintenance as a whole will prevent a further negative impact on the visual quality of the study area. The disposal of general solid waste and construction rubble (both during construction and maintenance of the development and staff courters) causes impacts on the natural environment (including faunal ecology, surface water and vegetation) if disposed of illegally. Compaction of soil</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		<p>surfaces and the propagation of weeds are typical impacts, but temporary.</p>
<p>Collection and disposal of solid domestic waste (O)(C)</p>	<p>Aesthetic quality, surface water run-off, subsurface and groundwater quality, vegetation and fauna.</p>	<p>Poor waste collection and handling on all the developments in and around the proposed development will pollute the environment (affecting fauna, groundwater, surface water and aesthetic environment). No illegal dumping of domestic waste will be tolerated. Untidy collection points and windblown refuse can cause human / animal conflicts, as foul odours from such areas will attract wild animals and cause other problems (pests / diseases), as well as water pollution.</p>
<p>Collection and disposal of construction waste (C)</p>	<p>Aesthetic quality, subsurface and ground water quality, vegetation and fauna.</p>	<p>No construction waste may be illegally dumped into the surrounding areas, as the effects of illegal dumping on</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		<p>the environment are devastating. Poor waste collection and handling on all the developments in and around the proposed development will have a negative impact on several environmental aspects. A waste collection agreement between the applicant and the local authority will be essential.</p>
<p>Long term employment opportunities and wealth to be generated by the proposed development (O)</p>	<p>Social aspects</p>	<p>There will be a positive impact in terms of social upliftment and job creation within the broader region.</p>
<p>Transportation of workers to and from the development site (C)</p>	<p>Air quality, soil surface and social aspects (including traffic and worker safety).</p>	<p>Poorly maintained vehicles will have a negative impact on air quality in terms of dust and emission. The tipper trucks from the nearby quarry will also add to the negative impact on air quality, but only during the construction phase.</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
<p>Construction camp establishment (c)</p>	<p>Aesthetic impacts, social aspects, subsurface and groundwater quality, generation of domestic waste, vegetation removal, soil surface compaction and faunal impacts.</p>	<p>The generation of domestic waste, as well as the provision of sewage facilities, within the construction camp could potential impact on the aesthetics of the site as well as the quality of subsurface and groundwater if not properly managed and implemented. Soil surfaces would become compacted as a result of activities within the camp. These impacts will also add to the negative impact other close by developments has on the local area, but only during the construction phase.</p>
<p>Movement of construction vehicles on site (C)</p>	<p>Air quality, soil.</p>	<p>Movement will cause limited or localised disturbances and temporary soil compaction, which promotes the establishment of weed species. Dust will be generated by vehicular</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		<p>movements on site. The transport trucks from the nearby farms will also add to the negative impact on air quality, but only during the construction phase.</p>
<p>Traffic safety on the main road (C and O)</p>	<p>Social aspects.</p>	<p>The access point to the site; therefore motorists using the main road may be negatively impacted on by slow moving construction vehicles. The transport trucks from the nearby farms will also add to traffic impact, but only during the construction phase.</p>
<p>Noise generation by operating air compressors, excavators and other heavy machinery. Noise is also generated by the construction workers (C)</p>	<p>Impacts on faunal species and surrounding land owners.</p>	<p>Excessive noise levels on site may negatively impact upon the behaviour and movements of site fauna. Surrounding land owners may also potentially be negatively impacted upon by excessive noise levels on site during construction. The tipper</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE C: construction stage O: operational phase	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	NATURE AND DESCRIPTION OF THE POTENTIAL <u>CUMULATIVE</u> IMPACT IN ASSOCIATION WITH THE SURROUNDING AREA
		trucks and excavators from the nearby towns will also add to the noise impact, but only during the construction phase.

8.3 Ecological Specialists' Impact Assessment & Recommendations (see Appendix 8 for the for all the Ecological Studies)

8.3.1 Impact Rating for the Site in Terms of Aquatic Ecosystems

The aquatic ecosystems study for the study area was done in terms of:

Risk assessment of the development is mainly based on a basic perceived risk and rating scale for the development. This is based on previous experience working on other similar projects as well as guiding documentation. A simple equation is used to quantify the perceived ecological risk:

$$ER \text{ (Ecological risk)} = (\text{Magnitude} + \text{duration} + \text{scale}) \times \text{Probability}$$

The risk assessment scaling is given in Table 15 of the Aquatic ecosystem delineation Report. Using the information from the equation the score is then used to quantify the following:

ER >75 High ecological risk;

ER 30 to 75 Moderate ecological risk

ER <30 Low ecological risk

The main possible risks to the system are calculated in Table 16 of the Aquatic ecosystem delineation Report. From the calculations, it is clear to see that the proposed

activities have on average a low (average 9.5) ecological risk profile. This is in line with the low impact of the proposed development on the aquatic ecosystems.

Risk assessment scaling:

Magnitude		Duration		Scale		Probability	
10	Very High/ Unclear	5	Permanent	5	International	5	Definite/ don't know
8	High	4	Long term (impact ceases after closure)	4	National	4	High Probability
6	Moderate	3	Medium term (5-15 years)	3	Regional	3	Medium probability
4	Low	2	Short term (0-5 years)	2	Local	2	Low probability
2	Minor	1	Transient	1	Site only	1	Improbable
1	None					0	None

Ecological risk assessment calculation:

Ecological aspect at risk	Risk score of impact				Probability	Ecological Risk (ER)	ER >75 High ecological risk; ER 30 to 75 Moderate ecological risk ER <30 Low ecological risk
	Magnitude	Duration	Scale	Total			
Flow	2	1	2	5	2	10	Low significance
Sediment regime	2	1	1	4	1	4	Low significance
Water quality	2	1	2	5	1	5	Low significance
Geomorphology	6	1	1	8	3	24	Low significance
Habitat	2	1	1	4	1	4	Low significance
Biota	2	1	2	5	2	10	Low significance
MEAN/ AVERAGE	3	1	2	5	1	9,5	Low significance

During the site visit four distinct wetland systems was observed within the study area, with most of the systems in average condition. The REMC/EIS of the systems were also moderate (1.8 and 1.7). The activities proposed on site include the raising of pigs, feed production, and manure processing. It is important to note that none of the manure will be released on site, but rather stored for use elsewhere. This combined with the fact that the development is not going to occur over any wetland and or buffer areas reduced the risk posed by the proposed development. It is a concern that if any stochastic events do occur, the impact of the proposed development on the aquatic ecosystem, in light of the Woodstock dam will be detrimental. The impact assessment calculations determined the impact score to 5.5 (Moderate): “The project can be authorised but with conditions and routine inspections”.

8.3.1.1 Mitigation Measures

Wetland related mitigation measures:

- Although no manure will be released into the natural environment, the handling of the manure must occur with care. Transfer of manure between transport vehicles must be done on a bunded area, with a dedicated dirty water trap;
- Piping and storage of manure must be regularly inspected (weekly) to ensure no leaks occur in the systems;
- Road infrastructure must avoid being adjacent to wetland and associated buffer areas. This is to prevent hard surfaces from the roads increasing water velocities into the wetland and creating other erosion areas;
- The use of natural vegetation barriers around buffer areas to ensure phytoremediation is increased;
- Storm water management on site must take cognisance of possible pollution arising from the site, with emphasis on hydrocarbon and manure pollution. This must also include the mitigation of speeds of storm water entering the wetland from the study site. strong attenuation must be included where possible; and
- Signage must also be included to increase awareness of the wetland found on site and the impact of customers on the wetland.

The study site is located in KwaZulu-Natal and the buffer requirements are up to the discretion of the specialist. For the study, site a buffer of 50 meters is proposed (as in line with the GDARD guidelines). This is acceptable as the impacts from the development are expected to be minimal and can be managed through monitoring and immediate interventions. It must be noted that none of the proposed developments fall within any of the wetland and or buffer areas. Clarity is however sought for impacts in terms of geohydrology of the proposed development on the water feeding into the wetlands. The irrigation channel did not receive a buffer as it is not a natural system.

The following general mitigation measures are proposed:

- An alien vegetation eradication programme should be implemented on the site to remove the alien vegetation from the wetland areas.

- An environmental control officer (ECO), specialising in aquatic systems (AECO) must be appointed throughout the project to ensure the longevity of the impacted aquatic system.
- The use of cement lined channels must be avoided at all costs and lining must be done with Loffel stones (or Amourflex stones) or similar products. This is to prevent the loss of habitat to aquatic organisms living in the system.
- The ramps for the in- and out flows from the construction site must be lined with Reno mattresses and or gabions to prevent structure undermining and to ensure flow is dispersed and mitigated. Vertical steps should not exceed 200 mm, to ensure aquatic fauna movement and migration.
- The use of gabion structures, well keyed into the surrounding bank walls and secured to the ground is recommended.
- If any construction activity must occur within the riparian areas then it must commence from upstream proceeding downstream with proper sedimentation barriers in place to prevent sediments and pollution moving downstream from the site. This includes non-perennial systems.
- The removal and translocation of impacted hydrophytes must be done prior to construction commencing.
- Due to the perennial nature of the system, construction should preferably commence during the dry months.
- All sensitive areas together with the associated buffer zones should be fenced during the construction phase to prevent any human activity from encroaching onto these areas. Monitoring of the fences is of paramount importance to ensure no infringement of the fences occurs.
- Removal of debris and other obstructing materials from the site must take place and erosion-preventing structures must be constructed. This is done to prevent damming of water and increasing flooding danger.
- Removed soil and stockpiling of soil must occur outside the extent of the watercourse to prevent siltation and increased runoff during construction. This includes the buffer zones and 1:100 year flood lines.
- Proper toilet facilities must be located outside the sensitive areas: The impact of human waste on the system is immense. Chemical toilets must be provided which

should always be well serviced and spaced as per occupational health and safety laws, and placed outside the buffer and 1:100 year flood lines.

- Spill kits must be stored on site: In case of accidental spills of oil, petroleum products etc., good oil absorbent materials must be on hand to allow for the quick remediation of the spill. The kits should also be well marked and all personnel should be educated to deal with the spill. Vehicles must be kept in good working order and leaks must be fixed immediately on an oil absorbent mat. The use of a product such as Sunorb is advised.
- No plant machinery may be stored or left near the aquatic areas, when not in use.
- Frequent inspection of the site must be done to ensure that no harmful practices occur on site.
- A photo collection must be taken from fixed demarcated spots to detect changes in the construction area over time. These photographs must be dated and should include the entire site.
- No construction personnel are allowed to collect, harvest or kill any species of fauna and flora on the site.
- Any species of fauna encountered during the construction phase should be moved to a safe location where no harm can be bestowed on the species.
- If water is sprayed on the construction surface for any reason during the construction process, utmost care must be taken to ensure the runoff water does not pollute the system or any of the associated catchment areas. A storm water cut-off drain should be constructed between the construction area and the aquatic system to ensure that storm water flowing through the construction area cannot flow into the aquatic system. The water from the cut-off drain must be collected in a sedimentation pond before entering the aquatic system.
- Any new erosion gullies must be remediated immediately.
- Construction should commence during the dry season or when flows are at their lowest where reasonably possible.
- Regular inspection of erosion preventing devices is needed.
- Construction camps: Plant parking areas and material stockpiles must be located outside the extent of the wetland.

- Access routes should be demarcated and located properly so that no damage to the system can occur. These roads must be adhered to at all times. A large turning place must be provided for larger trucks and machinery. No grading of temporary access roads is allowed as this will create dust and water runoff problems.
- Increased runoff due to removal of vegetation and increased soil compaction must be managed to ensure the prevention of siltation and the maximum stream bank stability.
- The velocity of storm water must be attenuated and spread. As far as possible the link between the stream and the local environment must be maintained. This is to ensure water movement into the soils and ensuring the survival of associated vegetation.
- Storm water leaving the site downstream must be clean and of the same quality as in situ before it enters the construction site (upstream). Preconstruction measures must be in place to ensure sediments are trapped.
- The overall alluvial characteristics of the drainage line (balance between sand, gravel, and stone) must be similar to before construction to ensure natural systems of flooding and sedimentation deportation and conveyance occur.

8.3.2 Impact rating for the proposed development in terms of flora

The methodology of impact assessment can be viewed in the vegetation report under section 2.6 (Appendix 8C).

Potential issues relevant to potential impacts on the ecology of the study area include the following:

- Impacts on biodiversity: this includes any impacts on populations of individual species of concern (flora and fauna), including protected species, and on overall species richness. This includes impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of concern.

- Impacts on sensitive habitats: this includes impacts on any sensitive or protected habitats, including indigenous forest, fynbos and wetland vegetation that leads to direct or indirect loss of such habitat.
- Impacts on ecosystem function: this includes impacts on any processes or factors that maintain ecosystem health and character

Impact Assessment before mitigation:

Impact	Severity	Duration	Extent	Consequence (S + D + F)	Frequency	Probability	Likelihood (F + P / 2)	Significance (C*L)
Impact on Indigenous Natural Vegetation	4	4	2	3.33	5	4	4.5	14.85 Medium
Loss of individual or threatened plants	4	4	2	3	4	1	2.5	7.5 Low
Establishment and spread of declared weeds and alien invader plants	5	5	2	4	5	5	5	20 High

Mitigation measures for Impact on Natural vegetation:

- Unnecessary impacts on surrounding natural vegetation must be avoided.
- The construction impacts must be contained within the footprint of the infrastructure.
- Disturbed areas beyond the footprint of the infrastructure must be rehabilitated as quickly as possible.

Mitigation measures for Loss of individual or threatened plants:

- Unnecessary impacts on surrounding natural vegetation must be avoided.
- The construction impacts must be contained within the footprint of the development. Disturbed areas beyond the footprint of the development must be rehabilitated as quickly as possible.

Mitigation measures for establishment and spread of declared weeds and alien invader plants:

- Disturbance of indigenous vegetation must be kept to a minimum. Where disturbance is unavoidable, disturbed areas should be rehabilitated as quickly as possible once construction is completed.
- Soil stockpiles should not be translocated from areas with alien plants into the site and within the site alien plants on stockpiles must be controlled so as to avoid the development of a soil seed bank of alien plants within the stock-piled soil.
- Any alien plants must be immediately controlled.
- An on-going monitoring programme should be implemented to detect and quantify any aliens that may become established and provide information for the management of aliens.

Impact Assessment after Mitigation:

Impact	Severity	Duration	Extent	Consequence (S + D + F)	Frequency	Probability	Likelihood (F + P / 2)	Significance (C*L)
Impact on Indigenous Natural Vegetation	3	4	1	2.66	5	2	3.5	9.81 Low
Loss of individual or threatened plants	4	4	2	3	4	1	2.5	7.5 Low
Establishment and spread of declared weeds and alien invader plants	3	3	2	2.66	5	5	5	13.3 Medium

Species of conservation concern that have historically been recorded from the area were evaluated to determine the likelihood of any of them occurring on site. Of the species that are considered to occur within the geographical area under consideration (within the quarter degree grid cell), there are species that have a MEDIUM probability of occurring on site. The threatened species include the following:

- *Schizoglossum peglerae* (Endangered)
- *Eucomis bicolor* (Near threatened)

- *Anemone fanninii* (Near threatened)

For the site visits conducted, no orange or red data species were encountered on the study site and 200m buffer area. A medium sensitivity was awarded for the study site based on the methodology described in Section 2.5 of this report. A total of 13 plants were identified on and around the site that is listed in the Alien and Invasive Species Regulations of 2014 (NEMBA) which is in need of management.

- 10 NEMBA Category 1b plants were identified and must be controlled.
- 3 NEMBA Category 2 plants were identified and must be controlled and if not eradicated, require a permit to carry out a restricted activity within an area, as specified in the act / regulations.

8.3.2.1 Mitigation Measures (flora)

Mitigation measures made by the specialist:

- (i) An Environmental Control Officer must be appointed to oversee mitigation measures during construction and will be responsible for the monitoring and auditing of the contractor's compliance with the conditions of the Environmental Impact Management Plan/ Programme.
- (ii) Areas deemed of medium significance must be mitigated as far as possible by implementing the measures indicated in this report.
- (iii) Areas to be disturbed by construction activity as well as areas for ancillary activities such as stock piles, storage yards or site offices must be clearly demarcated in already disturbed areas or areas where they will cause minimal disturbance.
- (iv) The extent of the areas must be minimised and demarcated by preferably using steel droppers and nylon rope between the markers. Construction activities and materials must at all times be contained within the demarcated sites.
- (v) Alien invasive species have to be controlled before and after construction commences for the 12 recorded alien and invasive plant species recorded on site.

- (vi) All mitigation measures described in this report has to be adopted into a legal Environmental Management Programme to be used during construction of the planned project.

8.3.3 Sensitivity rating for the proposed development in terms of fauna

Mammals

Contemporary pork production is conducted strictly in specialised buildings and no grazing on the veld is tolerated. Other than manure management, the impact of this form of farming is spatially limited but in situ entirely destructive. Given the declared planning for manure processing plant it is assumed that the risk of environmental contamination of the environment will be contained and that avoiding this risk will be conditional to the ROD.

The proposed development will progressively displace the mammals recorded from the building sites, but such a loss will be restricted to five small construction and operational facilities. The effect of the new development will not exceed the current environmental attrition by traditional hunting.

The five operational developments are very small and will intrinsically be isolated from surrounding natural areas. It is accepted that the highest risk to the environment (environmental contamination from accumulated pig manure) will be strictly managed according to statutory requirements and industry standards.

No reasonable objection can be offered to the implementation of the proposed development. Not only will the impact of the development not be overly high, but it will be small and contained within a large rural district. Copious amounts of nutrient-rich manure could pose an environmental risk and it is submitted that this facet of risk management must be conditional to the ROD.

8.3.3.1 Mitigation Measures (Mammals)

The following mitigation measures are proposed by the specialist:

- Should hedgehogs be encountered during the construction phase of the proposed development, these should be relocated to natural grassland areas in the vicinity.

- The contractors must ensure that no fauna species are disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- The proprietors must be contractually bound to implement the Environmental Management Plan (EMP) (the latter primarily dealing with manure management) and Record of Decision (ROD) during the operational phase of the development should be informed of their responsibilities in terms of the EMP and ROD.
- The owners should implement an ongoing monitoring and eradication program for all invasive and weedy plant species growing in the operational terrain (*sensu lato*).
- A comprehensive surface runoff and storm water management plan should be compiled, indicating how all surface runoff generated as a result of the development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / storm water and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions. This plan should form part of the EMP.

Herpetofauna

Although the general area is sensitive and includes a World Heritage Site, Nature Reserves, and important catchment dams, no important topographical features occur on the study area. The drainage lines and dams occur in the 500 metre surrounding area and should be considered as ecologically sensitive.

The possibility exists that at least some individuals of species with Red Data status such as Breyer's long-tailed seps, Drakensberg dwarf chameleon, coppery grass lizard and striped harlequin snake may occur on the study site. Measures will have to be taken to prevent development near the drainage lines and dams and to monitor water pollution of these water bodies.

If the development should go ahead, a very important indirect effect would be the likely impact that the proposed development might have on the water quality of the drainage lines due to the waste water and surface water runoff. This could have a negative impact on the herpetofauna.

8.3.3.2 Mitigation Measures (Herpetofauna)

The following mitigation measures are proposed by the specialist:

- The contractors must ensure that no fauna species are disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- The proprietors must be contractually bound to implement the Environmental Management Plan (EMP) (the latter primarily dealing with manure management) and Record of Decision (ROD) during the operational phase of the development should be informed of their responsibilities in terms of the EMP and ROD.
- The owners should implement an ongoing monitoring and eradication program for all invasive and weedy plant species growing in the operational terrain (*sensu lato*).
- A comprehensive surface runoff and storm water management plan should be compiled, indicating how all surface runoff generated as a result of the development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / storm water and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions. This plan should form part of the EMP.

Avifauna

It is unlikely that the proposed development will have any negative effects on any Red Data species recorded for the 2829CA q.d.g.c. provided that all mitigation measures are

strictly adhered to. Settling pond constructed to control runoff water and manure will attract more avifaunal species to the area.

The grassland area, indicated as high sensitivity, should be left undisturbed and undeveloped to ensure habitat for Red Data avifaunal species. Medium sensitive areas should also be kept free from any development to ensure future avifaunal biodiversity on the study site.

8.3.3.3 Mitigation Measures (Avifauna)

The following mitigation measures are proposed by the specialist:

- The development should be restricted to the proposed footprint area of the study site and should take place in areas that has already been disturbed through past human activities.
- Copious amounts of nutrient-rich manure from the piggery into fresh water systems such as the Woodstock dam could pose an environmental risk and proper measures should be implemented to prevent these pollutants from entering the fresh water systems.
- No surface stormwater and manure generated as a result of the development may be channelled directly into the Woodstock Dam. A series of stormwater, manure settling ponds and flood retention ponds should be constructed as part of the management plan for surface runoff and storm and waste water. This management plan should be applied outside of the demarcated wetland buffer/flood zone and should not impact on the natural hydrology and morphology of the dam.
- Since special care needs to be taken to prevent surface stormwater rich in sediments and other pollutants such as nutrient-rich manure generated from the piggery from entering the dam, mechanisms are required to prevent erosion and dissipate water energy, such as drainage diversions and berms.
- Measures should be implemented to prevent soil erosion as a result of storm water down flow.

- All powerlines that form part of the infrastructure of the development should be fitted with anti-collision devices to prevent birds from colliding with the powerlines.
- No plants not indigenous to the area, or exotic plant species, especially lawn grasses and other ground-covering plants, should be introduced in the landscaping of the proposed development, as they might spread into the areas of natural vegetation and into the wetland;
- The cultivation of trees and shrubs in gardens proven to be advantageous to birds should be encouraged. The area does not support indigenous trees and shrubs; however woody garden plants are accepted as a given and exotics will result in an influx of common garden bird species.
- Entrance by vehicles, especially off-road cars and bakkies, off-road bicycles and quad bikes to the areas to be excluded should be prohibited, both during the construction phase and during the lifespan of the project.
- The areas earmarked for exclusion from development must be fenced off during the construction phase to ensure that the developer and his contractors do not damage these areas or do not cover them with soil, builders' rubble or waste.
- Prior to commencement of the construction phase the wetland system and the proposed buffer zones must be properly fenced off and machinery and staff must be banned from entering the fenced areas.
- No development should be allowed within the wetland areas and the adjacent grassland areas on site, and these areas should be left as natural as possible.
- Proper veld management practises should be implemented with respect to grazing, burning and control of woody invasions.
- Where possible, work should be restricted to one area at a time, as this will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- Where possible the construction of the proposed development should take place during the winter months during the time when most avifaunal species are not breeding.
- No vehicles should be allowed to move in or across the wet areas or drainage lines and possibly get stuck. This leaves visible scars and destroys habitat, and it is

important to conserve areas where there are tall reeds or grass, or areas where there is short grass and mud.

- The contractor must ensure that no fauna is disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- It is suggested that where work is to be done close to the drainage lines, these areas be fenced off during construction, to prevent heavy machines and trucks from trampling the plants, compacting the soil and dumping in the system.
- During the construction phase, noise must be kept to a minimum to reduce the impact of the development on the fauna residing on the site.
- Alien and invasive plants must be removed.

8.4.4 Geohydrological Assessment Study Results (Water Availability)

This study presents the results of a Hydrogeological Investigation aimed at establishing a groundwater resource for the piggery and to serve as baseline reference of hydrogeological data to form part of a WULA (Water Use Licence Application). The development portion, Remaining Extent of Farm Steynsburg 7803 GS is located 42 km directly south of Harrismith on the southern side of the R74 main road.

The planned development land is 500ha in extent. The water demand for the sow unit will be 73 000m³/a or 200m³/d which needs to be satisfied. A desk study was performed to gather relevant geological and hydrogeological information. A hydro-census followed the desk study to establish borehole information in the region of the site. The purpose of this survey was to gather relevant hydrogeological information to study the groundwater regime, current groundwater use and borehole coordinates in the area. One existing borehole and six newly drilled boreholes are located on the development portion. Four existing boreholes could be located around the proposed development site. The existing boreholes are located few and far between.

A geological walk over the study area was done of the site to study the in-situ geology. A geophysical study was done to establish new drill sites for water boreholes. Six new

boreholes were drilled. Four of the six boreholes were submitted to borehole yield testing procedures. Two of the boreholes were reported as drilled dry during the drilling program. Four boreholes were reported to deliver low yielding volumes. The aquifer in which the boreholes were established was found to be a low yielding aquifer which shows serious signs of dewatering. A groundwater resource could not be established for the proposed development site due to the low groundwater ability of the groundwater regime on which the site is located.

During the hydrogeological study the following conclusions could be made:

- The hydro-census data gives a broad picture that groundwater volumes abstracted in the area around the planned Bergville site is low. This is due to the low groundwater potential in the area.
- A number of boreholes in the area are reported to be dried up.
- After drilling six boreholes which delivered low yields the aquifer can be regarded as a low yielding aquifer. (Aquifer with low Transmissivity values)
- The most cumbersome is that the yield tests showed that the boreholes is not only low yielding but also very fast dewatering the aquifer. (Aquifer with low Storativity values)
- From the chemical and bacteriological analyses it is clear that the groundwater at the Bergville site is of high quality. The water from borehole BH 6 can be chemically and bacteriologically categorized as Class 0, which can be used for domestic purposes without treatment.

The following recommendations are made:

- Boreholes BH 5 and BH 6 can be used for domestic purposes without treatment.
- It is recommended that surface water be used to supply in the water demand for the planned piggery site.
- Storm water originating from the piggery site must be treated as dirty water.
- Clean water and dirty water systems must be separated.
- Storm water must be directed away and around the piggery site.
- All water retention structures, including storm water dams, retention ponds, etc. should be constructed to have adequate freeboard to be able to contain water from 1:50 year rain events.

Conclusion:

There is enough drinking water for the pigs of this proposed piggery. Additional surface water availability is currently being investigated through the WULA process for the rest of the needed water amount to safely service this proposed piggery.

8.4 Feasibility and Comparison of Alternatives***8.4.1 Activity Alternative (Chicken Egg Laying Facility)***

Most of the same impacts will occur as with the proposed development. Although, possible higher developmental densities that will increase the overall impact on the environment on this local area.

Table 6: List of activities (environmental aspects) that will occur on site, the potential impacts that these activities may have on the environment and a description of the nature of the impact.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Vegetation clearance for the footprint of the proposed development (C). Clearance of vegetation in the establishment of infrastructure (C)	Soil layers, soil surface, indigenous vegetation cover.	On-site.	<p>The removal of vegetation cover, such that the soil surface is exposed, may lead to increased soil erosion in certain areas. The existing vegetation will be permanently removed to accommodate the footprint of the development. Where the removal of surface vegetation is of a temporary nature only, the establishment of weeds is a threat. The topsoil layer is required to rehabilitate the area (i.e. for landscaping the area). ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16</p> <p>This impact is of negative high significance before mitigation.</p>	<p>It is advisable that only vegetation be removed where and when it is necessary. After removal of vegetation, landscaping needs to be incorporated by re-establishing natural grassland/vegetation where appropriate. No red data plant species were recorded during the site visits conducted.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Stockpiling of excavated material (C)	Soil and vegetation cover.	Precise location still to be determined; the impacts on soil and vegetation will occur wherever stockpiles are established. Wherever possible, the stockpiles should be placed in non-sensitive areas.	<p>Stockpiles cause compaction of the soil, which promotes the establishment of weed species. The establishment of weeds greatly reduces the pristine quality of the natural vegetation on site. Stockpiles should not be situated within 200 m from any water bodies or water courses, as sedimentation transport into such systems is undesirable.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9</p> <p>This impact is of negative moderate significance</p>	<p>Stockpiles must not exceed 2 metres in height. Stockpiles must be used for filling material as the re use of stockpiles cannot be done on the road. By using the stockpiles as filling material for the sides, vegetation growth can be promoted by the seeds still contained in the topsoil layer.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low</u> significance</p>
Stockpiling building materials (C)	Soil and vegetation cover.	The impact is of a localized nature.	Stockpiles will need to be established for the storage of aggregate, bricks and cement. As mentioned, stockpiles cause	Building material stockpiles must not be stockpiles within any of the riparian areas. Any alien vegetation that

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>compaction of the soil surface, which leads to the growth of unwanted weed species.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>established itself because of disturbance need to be eradicated.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
<p>Water use for construction purposes of the development.</p>	<p>Use of ground water resources is possible but is it anticipated that NO natural surface water sources would be used. A WULA is being conducted in this regard. WULA will concentrate on this proposed development</p>	<p>On-site.</p>	<p>The use of water as an important resource must be assessed carefully and a statement should be made on the impact once it has been established what the source of the water for construction purposes will be. The WULA is also necessary as mentioned. ▲</p> <p>Probability = 4 (highly probable)</p>	<p>Water will most likely be sourced from boreholes. Possible significance assessment on ground water resources would be of moderate significance, because it will most likely come from underground resources.</p> <p>Probability = 4 (highly probable) Intensity = 2 (moderate intensity)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
	<p>due to:</p> <ul style="list-style-type: none"> • Section 21(a): taking water from a water resource; • Section 21(b): storing water; • Section 21(c): impeding or diverting the flow of water in a watercourse; • Section 21(e): engaging in a controlled activity (irrigation); • Section 21(g): disposing of waste in a manner which may detrimentally impact on a water resource; and 		<p>Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 4x3=12 This impact is of negative <u>moderate significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
	<ul style="list-style-type: none"> Section 21(i): altering the bed, banks course or characteristics of a watercourse 			
<p>Installation and operation of <u>temporary sewerage systems</u> for construction workers.</p>	<p>Soil layers, vegetation cover and groundwater.</p>	<p>Very localised and of a temporary nature.</p>	<p>The placement of chemical toilet systems and the servicing thereof will not have an impact on the environment, if operated according to requirements. Temporary toilets left unmanaged can leak raw sewage and effluent into the soil, surface and even ground water sources. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16</p> <p>This impact is of negative high significance before mitigation.</p>	<p>Temporary toilets need to be managed and serviced on a regular service schedule. This schedule has to be recorded and controlled by the contractor on site. Regular disposal of waste need to be done by a contracted disposal company. No temporary toilets will be allowed within 100 metres from any of the drainage lines.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
				<u>significance</u>
Provisions for storm water i.e. storm water drainage (C)	Soil surfaces, vegetation cover and drainage patterns.	Areas where surface water run-off is collected i.e. like from compacted surfaces, gutters and structures, as well as road surfaces.	<p>Poorly implemented storm water system will result in increased surface run-off volume and speed, which could lead to the creation of erosion gullies. Storm water must be allowed to spread out gradually over a large surface area to protect the soil surface against erosion. Inadequate designed storm water outlets can lead to flooding of the road surface, adding unnecessary volume to effluent dams which is dangerous.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9</p> <p>This impact is of negative moderate significance</p>	<p>Storm water outlet designs have to be done and construction undertaken within the correct design documents from the civil engineer. Vegetation cover needs to be established on bare soil areas to prevent erosion due to storm water.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low significance</u></p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
Maintenance of storm water management systems (O)	Soil surfaces, drainage patterns and surface water.	In all areas where storm water management systems have to be created.	<p>Storm water management will particularly be important with careful design eminent at the crossing of any natural drainage ways. Storm water outlets can get blocked due to debris and other substances that are washed from the hard surfaces. This includes siltation due to soil erosion.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9</p> <p>This impact is of negative moderate significance</p>	<p>Maintenance of storm water outlets is required to ensure that they don't get blocked (i.e. no longer fulfil their function) or result in erosion. The custodian of the development has to perform regular checks and maintenance.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low</u> significance</p>
Excavations in general	Potential impact on elements of cultural or heritage importance.	Localised if these may occur	Possible archaeological impacts are confirmed in the Heritage report. It is possible that historical important items or graves could be uncovered if construction	If any artefacts, graves or articles of historical importance are found during construction, the construction activities have to be stopped and the area fenced

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>commences. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16</p> <p>This impact is of negative high significance before mitigation.</p>	<p>off. A heritage consultant will have to be appointed to take any further related steps such as relocation.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low significance</u></p>
<p>Generation of construction waste (C)</p>	<p>Soil, vegetation, aesthetic quality of the site and surface water run-off, water and ground water resources.</p>	<p>All construction sites and directly adjacent areas within the development.</p>	<p>Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly. Further to littering the site and adjacent areas, poor control and illegal dumping of construction waste can pollute surface water run-off, as well as lead to the promotion of weed species. ▲</p>	<p>Building rubble has to be collected at a centralized area and preferably in skip waste bins. No illegal dumping may be allowed in the construction phase and this will have to be checked and monitored by the appointed Environmental Control Officer.</p> <p>Probability = 3 (improbable)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Site maintenance (O)	Vegetation and soil surface conditions, as well as social well-being of the residents of the area.	The site need to be maintained.	<p>Poorly maintained storm water drainage structure will cause abnormal soil erosion at outlets. Therefore, site & road maintenance is essential.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Site & road maintenance is essential and is the responsibility of the property owner in the operational phase.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Collection and disposal of	Aesthetic quality, surface	The site and directly	Poor waste collection and handling will	No illegal dumping of domestic and

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
solid construction waste (C)	water run-off, subsurface and groundwater quality, vegetation and fauna.	adjacent areas.	<p>pollute the environment (affecting fauna, groundwater, surface water and aesthetic environment).</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>construction related waste should be tolerated. Domestic construction waste has to be collected into central waste skip disposal units.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
Traffic movement (C)(O)	Noise levels around the development due to the movement of additional traffic.	Noise impact of a local nature along the developments. Closer community.	<p>The movement of traffic (during construction and operation) around the development will have an impact on the ambient or prevailing noise levels.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term)</p>	<p>Noise mitigation measures are required in order to keep the noise generated by construction activities as low as possible. This can be achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example, poor</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance.</p>	<p>maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as construction outside of these time frames will be a nuisance to adjacent dwellers. On operational phase the general business day noise will be the same as for the surrounding properties.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>
Temporary employment created during the	Social aspects	All sites where construction related	There will be positive impacts in terms of social upliftment and job creation within	

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
construction phases of the proposed development(C)		activities are to take place.	the broader region.	
Transportation of workers to and from the development site (C)	Air quality, soil surface and social aspects (including traffic and worker safety).	The road safety of the region. A local issue.	<p>Vehicles used to transport workers can be overloaded; worker safety is of utmost importance. Vehicles used to transport workers which exceed the speed limit are dangerous.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Traffic safety measures have to be implemented by the contractor. Correct signage and safety clothing needs to be in place. Construction workers need to be transported to and from the site on a safe manner.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
Construction camp establishment (C)	Aesthetic impacts, social aspects, subsurface and groundwater quality,	Location still to be determined.	The generation of domestic waste, as well as the provision of sewage facilities, within the construction camp could	Proper management of any temporary toilets need to be undertaken on a strict schedule. The construction camp must be

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
	generation of domestic waste, vegetation removal, soil surface compaction and faunal impacts.		<p>potential impact on the aesthetics of the site as well as the quality of subsurface and groundwater if not properly managed and implemented. The removal of sections of natural vegetation would most likely be needed for the establishment of the camp, and soil surfaces would become compacted as a result of activities within the camp.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>more than 100 metres away from any water bodies. Construction camps</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
Housing of workers during construction (C)	Aesthetic character, soil and vegetation, surface water quality and social	The possibility of housing construction workers on site.	The establishment of housing for workers will have a localised impact on the soil and vegetation cover of the chosen site,	Housing of workers on site, at the construction camp, is a possibility. Preferably only security should look after

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
	aspects.		<p>as well as potentially having a negative impact on the quality of surface water - as a result of domestic waste, and sanitation facilities for example, if these are not properly addressed. Safety is also a concern to residence and stay of workers on site should not be encouraged.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>equipment at night time hours. If workers are housed near residential areas it could create a safety concern.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Sanitation provision to workers during the working day (C)	Subsurface soil, surface water and subsurface water quality.	Insufficient chemical toilets will have a health impact locally.	Insufficient chemical toilets will have a health impact. Subsurface soil contamination and contamination of surface / subsurface water quality could	Sufficient chemical toilets should be provided for workers, in the range of 1 per every 8 workers, within walking distance of all construction activities.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>occur if the ablution facilities provided are not according to standard. A temporary impact is possible; however, it can easily be prevented.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>These toilets must be well maintained and inspected on a daily basis to ensure that they are clean and functioning properly. No washing of people and/or goods should take place on cleared surfaces, as this water should not be allowed to drain into any adjacent storm water canals or drainage lines.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
Movement of construction vehicles on site (C)	Air quality, soil and vegetation cover.	Potential impacts may be eminent over a wide area if not carefully managed and restricted.	Movement will cause limited or localised disturbances and temporary soil compaction, which promotes the establishment of weed species. Dust will	Alien plant species need to be controlled and it must be ensured that weeds are removed. Dust depression measures such as watering the bare surfaces need to be

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>be generated by vehicular movements on site.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>implemented.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low significance</u></p>
Maintenance of construction vehicles (C)	Soil, vegetation and surface water.	Within the construction camp(s).	<p>In the event of on-site repairs and servicing, soil surfaces, vegetation, and run-off may be locally contaminated. Spillage of fuel through faulty bowser is a possibility, if not controlled. It is anticipated that fuel storage facilities will occur on the site. If poorly installed or managed it will cause pollution.</p> <p>Probability = 3 (probable)</p>	<p>The construction camp has to be identified and communicated to the ECO as soon as its position is available. Any fuel depot areas have to be bunded and where fuel hoses will operate, absorbing gravel needs to be provided. This area can also be lined with a small piece of plastic below the gravel. As soon as any spillages occur, the gravel has to be collected and disposed of as hazardous</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>waste. Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6 This impact is of negative <u>low</u> significance</p>
<p>Traffic safety on the main roads (C and O)</p>	<p>Social aspects.</p>	<p>At all places where there will be interaction with the local traffic along existing routes as well as traffic moving through the area.</p>	<p>Motorists using the main roads and alternative roads may be negatively impacted on by slow moving construction vehicles.▲ Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high</p>	<p>Traffic safety measures have to be implemented to ensure that the general public is safe. Adequate traffic signage has to be implemented where any heavy vehicles will cross the main roads. Adequate clothing that is visible should be provided to the workers. Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			significance before mitigation.	Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u>
Noise generation by operating air compressors, excavators and other heavy machinery. Noise is also generated by the construction workers (C)	Impacts on faunal surrounding land owners.	Areas on and surrounding site at which construction activities take place.	Excessive noise levels on site may negatively impact upon the behaviour and movements of site fauna. Surrounding land owners may also potentially be negatively impacted upon by excessive noise levels on site during construction. ▲ Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.	Noise mitigation measures are required in order to keep the noise generated by construction activities as low as possible - given the site's relatively close proximity to some residential areas. This can be achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example, poor maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as construction outside of these time frames will be a nuisance to adjacent

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
				<p>dwellers.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>
Heritage (C)	Heritage or historical components	Historical features are present on site.	<p>The proposed development is to be conducted near or on possible cultural historical elements. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>If any areas of historical significance are discovered during construction, work should be stopped and a cultural specialist should investigate the site. The first contact can be made with the EAP on site.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3)</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
				<p>Significance= 3x3=9</p> <p>This impact is of negative <u>moderate significance</u></p>
Impact on the wetlands (C) (O)	Water quality, and soil	In and around the wetland areas.	<p>Impacts on the wetland could be caused by the construction activities and possible siltation into the wetland, although no construction will occur in any wetlands. ▲</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9</p> <p>This impact is of negative <u>moderate significance</u></p>	<p>Please refer to Pg. 108 under section 8.3.1.1: Mitigation measures. This was formulated by the aquatic specialist.</p> <p>Probability = 3 (improbable) Intensity = 2 (moderate intensity) Duration = 2 (short term) Severity = 2x2=4 (rating 2) Significance= 3x2=6</p> <p>This impact is of negative <u>low significance</u></p>
Movement and survival of Animal species	Fauna of the site	Within the site	<p>The construction will have an effect on the animals present within the site. These impacts will include habitat destruction. It will also limit movement of species through the site.</p>	<p>Specialist studies have determined an overview of the habitat present on-site. Red data avifauna have been recorded during the EAP's site visit.</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT THAT MAY BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE IMPACT/ISSUE BEFORE MITIGATION	NATURE OF THE IMPACT/ISSUE AFTER MITIGATION
			<p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative moderate significance</p>	<p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>
Construction of the proposed development on red data animals	Animals	On-site	<p>The construction of the proposed development will influence animal life and habitat. Red data avifauna species were recorded during the site visits. ▲</p> <p>Probability = 4 (highly probable) Intensity = 4 (high intensity) Duration = 4 (long term) Severity = 4x4=16 (rating 4) Significance= 4x4=16 This impact is of negative high significance before mitigation.</p>	<p>Although habitat will be lost, proper rehabilitation of the site, not used, could lessen the severity of the impact.</p> <p>Probability = 3 (probable) Intensity = 2 (moderate intensity) Duration = 4 (long term) Severity = 2x4=8 (rating 3) Significance= 3x3=9 This impact is of negative <u>moderate significance</u></p>

8.4.1.1 Summary of the Significance Rating of the Anticipated Impacts

ENVIRONMENTAL AND OTHER COMPONENTS TO BE AFFECTED BM = before mitigation AM = after mitigation	Probability value	Intensity value	Duration value	Severity value	Significance rating
Impact on the vegetation component of the site	BM: 4 AM: 3	4 2	4 2	4 2	16: High (negative) 6: Low (negative)
Impact on the faunal component of the site	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on Red Data Fauna and Flora	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on soil (surface stability)	BM: 3 AM: 2	2 1	2 4	2 2	6: Low (negative) 4: Low (negative)
Impact on soil (topsoil layer - disturbance and compaction)	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on subsurface soil quality	BM: 2 AM: 2	2 2	2 4	2 3	4: Low (negative) 6: Low (negative)
Impact on topography	BM: 2 AM: 0	2 0	2 0	2 0	4: Low (negative) 0
Impact on geology	BM: 2 AM: 0	2 0	2 0	2 0	4: Low (negative) 0
Impact on surface drainage and existing water bodies	BM: 4 AM: 4	2 2	4 2	3 2	12: Moderate (negative) 8: Moderate (negative)
Impact on surface water run-off quality	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on groundwater resources	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on air quality	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on ambient noise levels	BM: 4 AM: 2	4 2	4 2	4 2	16: High (negative) 4: Low (negative)
Impact on cultural historical & archaeological elements	BM: 4 AM: 3	4 2	4 4	4 3	16: High (negative) 9: Moderate (negative)
Impact on the social environment of the adjacent landowners	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on traffic safety aspects	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (negative) 4: Low (negative)
Impact on land use & agricultural potential	BM: 2 AM: 2	2 2	2 2	2 2	4: Low (negative) 4: Low (negative)
Impact on visual and aesthetic quality	BM: 2 AM: 2	2 2	2 2	2 2	4: Low (negative) 4: Low (negative)
Impact on local economy (due to job creation)	BM: 4 AM: 2	2 2	2 2	2 2	8: Moderate (positive) 4: low (positive)
Impact on community (due to job creation)	BM: 2 AM: 2	1 1	2 2	2 2	4: Low (positive) 4: Low (positive)

8. KNOWLEDGE GAPS, UNCERTAINTIES AND ASSUMPTIONS

There was no knowledge gaps identified due to the fact that all relevant parties (I & APs and Specialists) were consulted and valuable information was received and recommendations made.

No assumptions were made also because the necessary studies were conducted and the information was made available to relevant stakeholders and these studies were incorporated into the planning and design of this development.

Uncertainties will always be part of any development when it comes to the actual degree of impact it will have on the immediate environment, because no project is identical. Any and real results can only be recorded after the development has started and finished.

9. ENVIRONMENTAL IMPACT STATEMENT

9.1 Development Upkeep.

All services and maintenance to this proposed development will also be part of the developer/individual/municipality responsibility.

9.2 Biophysical- and Socio-Economic Environment

9.2.1 Flora

All impacts of the development were rated as low to moderate significance. Recommendations from the specialist should be closely adhered to.

For the site visits conducted, no orange or red data species were encountered on the study site and 200m buffer area.

9.2.2 Fauna

All impacts of the development were rated as **low to moderate** significance. The proposed area of development does not support a unique faunal composition. Development of the proposed area, with regards to the mammal fauna, avifauna and

herpetofauna, should not impact negatively on the ultimate survival or dynamics of the encountered taxa and can proceed as planned.

9.2.3 Historical Value

Please see section 5.2.10 pg. 56.

Recommendations from the Heritage specialist:

- It is recommended that an Archaeological Impact Assessment (AIA) be conducted on the Pig Housing Facility 3 site to determine archaeological significance and mitigation.
- It is recommended that graves are preserved in situ. If this best practice scenario cannot be achieved the correct processes and procedures must be adhered to in regard to exhumation, relocation and reinternment of skeletal remains.
- All structures older than 60 years are protected by the National Heritage Resources Act (Act 25 of 1999). If structures older than 60 years are to be demolished the necessary permission must be obtained from the provincial heritage authority.
- The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Programme. See 3.2.6 and 3.2.7 of the HIA.

9.2.4 Aquatic Ecosystem

During the site visit four distinct wetland systems was observed within the study area (FIGURE 20), with most of the systems in average condition. The REMC/EIS of the systems were also moderate (1.8 and 1.7). The activities proposed on site include the raising of pigs, feed production, and manure processing. It is important to note that none of the manure will be released on site, but rather stored for use elsewhere. This combined with the fact that the development is not going to occur over any wetland and or buffer areas reduced the risk posed by the proposed development. It is a concern that if any stochastic events do occur, the impact of the proposed development on the aquatic ecosystem, in light of the Woodstock dam will be detrimental. The impact

assessment calculations determined the impact score to 5.5 (**Moderate**): “The project can be authorised but with conditions and routine inspections”.

9.3 Comparative Summary Assessment between the Alternatives

Table 7: Comparative assessment between the Alternatives.

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
Geology	No impact. Area too small and there is no detrimental geological feature on site.	No impact. Area too small and there is no detrimental geological feature on site.	No impact.
Topography	No impact.	No impact.	No impact.
Soil, Land Capability and Land Use	Soil compaction. Possible soil erosion due to removed vegetation. Surface disturbance and topsoil removal.	Greater soil compaction impact. Possible soil erosion due to removed vegetation. Larger surface disturbance and topsoil removal.	Possible dumping on vacant and derelict land.
Flora	Stripping of surface vegetation during construction. Possible sensitive flora on site.	Stripping of surface vegetation during construction. Possible sensitive flora on site.	No impact.
Fauna	Removal of surface vegetation thereby depleting food sources.	Removal of surface vegetation thereby depleting food sources.	No impact.

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
	<p>Human presence resulting in emigration of animals.</p> <p>The disturbances of the vegetation cover and natural habitat will have a limited impact on the wildlife.</p> <p>However, it should be viewed against the background of the disturbances by human movement and activities through the area.</p>	<p>Human presence resulting in emigration of animals.</p> <p>The disturbances of the vegetation cover and natural habitat will have a limited impact on the wildlife.</p> <p>However, it should be viewed against the background of the disturbances by human movement and activities through the area.</p>	
Surface Water	<p>Impacts on the wetland could be caused by the construction and operational phase.</p> <p>Drainage line could be altered or blocked by construction activities.</p>	<p>Impacts on the wetland could be caused by the construction and operational phase.</p> <p>Drainage line could be altered or blocked by construction activities.</p>	No additional impact.
Ground Water	<p>Low potential environmental impact predicted. Ground water not available to this project.</p>	<p>Low potential environmental impact predicted. Ground water not available to this project.</p>	No impact.

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
	<p>Temporary toilets (chemical) left unmanaged can leak raw sewage and effluent into the soil, surface and even ground water sources, during the construction phase.</p> <p>Possible contamination of ground water from faulty or unmanaged effluent dams.</p>	<p>Temporary toilets (chemical) left unmanaged can leak raw sewage and effluent into the soil, surface and even ground water sources, during the construction phase.</p>	
Air Quality	<p>Low potential environmental impact. During the construction phase; dust could cause problems for nearby human settlements. During the operational phase the air quality will be the same as it currently is.</p>	<p>Low potential environmental impact. During the construction phase; dust could cause problems for nearby human settlements. During the operational phase the air quality will be the same as it currently is.</p>	<p>The air quality will be the same as it currently is.</p>
Noise	<p>Moderate potential environmental impact.</p> <p>Noise from the farm traffic will be an</p>	<p>Moderate potential environmental impact.</p> <p>Noise from the farm traffic will be an</p>	<p>No impact additional impact.</p>

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
	inconvenience to a certain extent for some existing properties adjacent to the site.	inconvenience to a certain extent for some existing properties adjacent to the site.	
Visual	<p>No significant impact.</p> <p>This is all agricultural land and the proposed development is also agricultural. Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly.</p>	<p>No significant impact.</p> <p>This is all agricultural land and the proposed development is also agricultural. Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly</p>	No impact.
Sensitive Landscapes	<p>Sensitive landscapes identified will include the surrounding wetland and drainage lines.</p> <p>According to the Aquatic Ecosystem study a moderate potential impact is predicted before any mitigation measures is employed.</p>	<p>Sensitive landscapes identified will include the surrounding wetland and drainage lines.</p> <p>According to the Aquatic Ecosystem study a moderate potential impact is predicted before any mitigation measures is employed.</p>	No new or additional impact.

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
	<ul style="list-style-type: none"> • Removal of surface vegetation thereby depleting food sources. • Human presence resulting in emigration of animals. • The disturbances of the vegetation cover and natural habitat will have a limited impact on the wildlife. However, it should be viewed against the background of the disturbances by human movement and activities through the area. • The movement of water into the wetland will be altered by construction activities. 	<ul style="list-style-type: none"> • Removal of surface vegetation thereby depleting food sources. • Human presence resulting in emigration of animals. • The disturbances of the vegetation cover and natural habitat will have a limited impact on the wildlife. However, it should be viewed against the background of the disturbances by human movement and activities through the area. • The movement of water into the wetland will be altered by construction activities. 	
Sites of Archaeological and Cultural Interest	<p>Possible significant impact.</p> <p>The study area (Pig Housing Facility 3) does contain archaeological sites and material. The study area does contain marked graves and burial grounds.</p>	<p>Possible significant impact.</p> <p>The study area does contain archaeological sites and material. The study area does contain marked graves and burial grounds</p>	<p>No impact.</p>

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
Socio-economic	<p>Positive impact on the regional socio-economic structure through its support to the community, like:</p> <ul style="list-style-type: none"> ⤴ Job opportunities during the construction phase. ⤴ Local economic boost. 	<p>Positive impact on the regional socio-economic structure through its support to the community, like:</p> <ul style="list-style-type: none"> ⤴ Job opportunities during the construction phase. ⤴ Local economic boost. 	<p>Negative Impact due to no additional job opportunities created.</p>
Interested and Affected Parties	<ol style="list-style-type: none"> 1. What are the dangers of the project? 2. “We like projects because they opened job opportunities and when on our terms in office is completed we hope than even those who will come in after the local municipal elections will take it forward.” 3. Negotiations between Okhahlamba Local Municipality and the relevant dwellers already took place. 	<p>The comments will most likely be the same.</p>	<p>No impact. Status quo remains.</p>

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
	<p>4. Is there training that will be provided to people who will make the piggery feeds.</p> <p>5. If the project kick starts, what is the estimate of the employment? The meeting agreed that during the recruitment of people, the recruitment should go across wards 8, 9 and 10.</p>		
<p>Cumulative</p>	<p>The cumulative impact of the development on the social environment is positive. More job creation opportunities.</p> <p>Seen at a wider scale the additional developments are not physically connected, but the removal of vegetation cover, such that the soil</p>	<p>The cumulative impact of the development on the social environment is positive. More job creation opportunities.</p> <p>Seen at a wider scale the additional developments are not physically connected, but the removal of vegetation cover, such that the soil</p>	<p>No impact. Status Quo.</p>

Environmental Aspects	Proposed Development	Proposed Chicken Egg laying Facility Alternative	No - Go
	surface is exposed, may lead to increased soil erosion in the area and loss of habitat.	surface is exposed, may lead to increased soil erosion in the area and loss of habitat.	

10. CONCLUSION AND RECOMMENDATIONS

The EIA Process for the proposed development has been undertaken in accordance with the EIA Regulations published in Government Notice R 982 of 4 December 2014 in terms of the National Environmental Management Act (Act No. 107 of 1998), as amended.

The essence of any EIA process is aimed at ensuring informed decision-making and environmental accountability, as well as to assist in achieving environmentally sound and sustainable development. This is achieved by conducting an analysis of the potential impacts that a proposed development may have on the physical, environmental and social aspects of the concerned area. In order to minimise the potential impacts associated with the proposed development, an EMPr is compiled, which must be implemented in order to sufficiently mitigate the anticipated impacts to an acceptable level.

In summary, it can be concluded that the proposed development will experience impacts on the environment, social and economic aspects.

These are:

Environmental components to be affected negatively	Description of the anticipated environmental & socio-economic impacts / key issues
Properties	<ul style="list-style-type: none"> Noise, Odour and safety impacts.
Possible Odour Impact	<ul style="list-style-type: none"> Odour from the piggery, if not managed properly, could cause an irritation to adjacent land owners.
Traffic impact	<ul style="list-style-type: none"> The development will also affect the local community in a possible negative way, during the construction phase, as traffic into and out of the farm may cause congestion.

Business areas	<ul style="list-style-type: none"> • Positive impact: This development will attract business to the areas and boost the local economy. Job creation is a great possibility.
Water provision	<ul style="list-style-type: none"> • An increase in water demands due to the proposed development.
Ground Water	<ul style="list-style-type: none"> • Abstraction could deplete the aquifer, but according to the Geohydrological study no groundwater is available. • Contamination from the slurry treatment facility could pose a risk to ground water.
Habitat loss	<ul style="list-style-type: none"> • Loss of natural vegetation due to the proposed development, although the loss of habitat, proportionally to the wider region of similar natural vegetation, will be very small.

10.1 Authorisation of Project

The identification and description of the potential or anticipated impacts (herein referred to as environmental aspects) was the result of an assessment of the relevant environmental conditions and the issues identified during the public participation exercise, terrain assessments, specialist studies and desktop research. An objective rating of the SIGNIFICANCE of the potential impacts resultant of the proposed development revealed that impacts were predominantly LOW to MODERATE (negative) during the construction phase, but if mitigated correctly the significance of the impact drops to LOW. There are also two low to moderate (positive) impact anticipated (Local economy and social impact) during the operational phases respectively. This means that it is possible for the project to proceed, providing that the impact mitigation measures provided are strictly implemented in the design, construction and operational phases of the development.

The EIA process revealed that no fatal environmental flaws were identified that should prevent the approval of the proposed development. In summary, the main environmental aspects that need to be addressed during project implementation are:

- Design stage: The proposed development position layout should be well thought out, in terms of the proposed site and consequently is matter of fact so.
- Construction stage: Addressing general social and traffic safety, air quality, noise generated, waste management, construction activities and restoration/landscaping of the site.
- Operational stage: Maintaining all infrastructure on a regular basis and promoting jobs.

The ultimate approval of this project lies with the ruling of KZN EDTEA. However, this EAP (Rock Environmental Consulting) is of the independent opinion that the EIA process will conclusively determine if there are any fatal environmental flaws associated with the proposed development that would constitute the refusal of Authorisation of the project - bearing in mind that approval must be subject to strict implementation and monitoring of the EMPr compiled, and given that there should be room for improving the EMPr as the project progresses. It is trusted that this Basic Environmental Assessment Report gives a balanced view of the anticipated environmental impacts associated with a proposed development of this nature.

11. UNDERTAKING UNDER OATH BY THE EAP

An undertaking under oath by the EAP in relation to:

- (i) the correctness of the information provided in the report;
- (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties;
- (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and
- (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.



Rowan van Tonder

REC

APPENDIX 1

ENVIRONMENTAL MANAGEMENT PROGRAM



SERVICES (PTY) LTD

T/A ROCK ENVIRONMENTAL CONSULTING

PO Box 40541
Moreleta Park, 0040
601 Rubenstein Drive
Moreleta Park, 0181
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PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS, KWAZULU-NATAL.

ENVIRONMENTAL MANAGEMENT PROGRAMME

Prepared for: Kwazulu-Natal Department of Economic Development,
Tourism & Environmental Affairs

And

Applicant: Steynsburg Pork and Abattoir (Pty) Ltd.

Prepared by: Rock Environmental Consulting
E-mail: rock.rowan@lantic.net

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February 2017

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Environmental Management

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ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) AND EXPERTISE

- EAP: P.N. van der Merwe (Director)**
- Expertise: Environmental Impact Assessments in Land-use and Infrastructure Development.
 - Years of experience: 25. Qualifications: B.Sc. Hons. Environmental Management PU for CHE.
- EAP: Rowan van Tonder**
- Expertise: Currently involved with various applications for activities under the National Environmental Management Act (NEMA) (Act 107 of 1998), Mineral and Petroleum Recourses Development Act 2002 (Act No. 28 of 2002), and National Environmental Management: Waste Act, 2008 (Act 59 of 2008).
 - Years of experience: 9. Qualifications: M.Sc. Botany (Conservation Management), B.Sc. Hons. Physical Geography - Environmental Management at TUKS. (For Extended Details, See Appendix 6 - EAP CV).

GENERAL TERMS AND ABBREVIATIONS:

Audit	Regular inspection and verification of implementation of the EMPr
Bund	A sealed enclosure under or around a storage facility to contain any spillage
Batch plant	Concrete or plaster mixing facility and associated equipment and materials
Contractor	Principal persons or company undertaking the construction of the development
Development site	Boundary and extent of development works and infrastructure
Engineer	Person who represents the client and is responsible for enforcing the technical and contractual requirements of the project
ECO	Environmental Control Officer: - Person tasked with monitoring implementation of the EMPr during construction
Emergency situation	An incident, which potentially has the ability to significantly impact on the environment, and which could cause irreparable damage to sensitive environmental features. Typical situations amongst others are: <ul style="list-style-type: none"> • Large spills of petroleum products and lubricants on site, • Potential damage, erosion and slumping of unstable slopes, • Indiscriminate dumping of construction waste on site, and accessing exclusion zones
RE/PM	Resident Engineer/Project Manager: Person representing the Engineer on site
BAR	Basic Assessment Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Program
GDARD	Gauteng Department of Agriculture and Rural Development
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)

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1. INTRODUCTION

This Environmental Management Programme (EMPr) describes impact mitigation measures to be implemented during the construction and operation phases of the proposed 4800 sow unit piggery (known as the 'Development' from here on) to be established 21 km northwest of Bergville on the Remaining extent of the farm Steynsburg 7803-GS, Kwazulu-Natal.

The careful implementation and management of activities on site, during the entire process of project construction and operation, is vitally important. Focus should be placed on the activities to occur on the site of the proposed development; however, consideration of the adjacent environment (socially and ecologically) is equally important. The mitigation measures represented in this EMPr should not be seen as static measures, but rather as methodologies that can be updated and improved during implementation, as and when site conditions become clearer. However, this EMPr sufficiently serves to provide the most practicable methods to promote sound environmental management during the construction and operational phases of the development.

The measures and principles are provided to assist placing impacts identified in another perspective - more towards the firm potential of mitigating the impacts during the development and implementation of the project. But this, as already mentioned, also implies that during the course of the project certain adaptations can be made or will be eminent during the construction implementation period. These adaptations will be the result of the EMPr monitoring exercise that is planned to take place during the construction period. The EMPr subsequently is an on-site working and dynamic document.

This section of the report provides recommendations on matters relating to the impact of the development on the physical environment, the biological environment and the social environment (of the site and study area) by describing mitigation measures that are to be implemented.

2. PROJECT DESCRIPTION

Proposed development to be established 21 km northwest of Bergville on the Remaining Extent of the farm Steynsburg 7803-GS, KwaZulu-Natal. Entrance to the property is from the R74 right across from the access road to ATKV Drakensville. From Bergville BP filling

station, in a westerly direction, on the R74, the turnoff to the farm is about 24.5 km on your left hand side. GPS Coordinate is: 28° 38'9.55"S, 29° 8'33.22"E.

The project will consist of a pig housing complex on sites 1, 2 & 3 plus the manure processing facility and the feed factory. The different piggery complex components and taking into account that the construction footprint is usually somewhat more than it is predicted, the site will cover an area of 15.6 ha. Site 1 will cover in the order of 4 ha; site 2 will cover an area of 1.7 ha; site 3 will cover 7.7 ha; the feed factory and the manure processing plant will cover an area of 3.3 ha.

3. DESCRIPTION OF THE ENVIRONMENTAL ASPECTS OF THE ACTIVITY

Environmental Aspects	Proposed Development
Geology	<p>The Karoo basin was the site of an inland sea, where fossil deposition took place, predominantly during the Permian period. The sea was deepest (and therefore has the thickest deposits) between Graaff Reinet and Somerset East, thinning out completely at the Mvoti River in the north. Over time these deposits formed what is now referred to as the Ecca geological group, comprising shale and sandstone formations. In KZN the shale is thin.</p> <p>In the KZN Midlands there are three main types of Ecca shale - Vryheid shale, Volksrust shale and Pietermaritzburg shale. Estcourt shale is also evident from Mooi River northwards.</p> <p>In the KZN Midlands there is also a lot of dolomite formation. Both sills (horizontal), and dykes (vertical), with the dykes in such numbers in the Berg and around Nottingham Road, that they are referred to as Dyke Swarms. The dolomite dykes compartmentalise the shale, and once breached, gas can escape and polluted groundwater can rise.</p> <p>On the maps below, the Ecca Shale groups (Vryheid, Pietermaritzburg, Volksrust and Estcourt) are marked Pv, Pp, Pvo</p>

	<p>and Pes respectively. Shale is shown as the brown colour. The pink colour is dolerite. The Midlands has similar geology to that of the Karoo, and is intruded by dolerite. The Berg area has very little shale and it is intersected by dolerite dykes. Nottingham Road has Escourt shale and swarms of dolerite.</p> <p><u>Impacts:</u> Blasting/Drilling of geology to accommodate foundations of the development.</p>
<p>Topography</p>	<p>Sensitive features include the various small wetlands, drainage lines and small dams around the sites.</p> <p>The ‘terrain type’ of the area is classified as open low hills or ridges. The terrain contains some distinct topographical sections, namely:</p> <ul style="list-style-type: none"> • A small wetland, with small dams, and a drainage line in the eastern part of the property; • Drainage lines are also found in the western part of the property; • Farm structures in the central part and southeast corner of the property; • Northern boundary is bordered by agricultural fields; • A DWS water scheme canal forming the southern and western border. <p>The area has a very gentle slope. The site falls within the Thukela - Woodstock Dam Quaternary catchment area (V11D catchment).</p> <p><u>Impacts:</u> Blasting/Drilling of geology to accommodate foundations may alter the topography slightly.</p>
<p>Soil, Land Capability and Land Use Systems</p>	<p>The Okhahlamba Local Municipality consists mainly of the Grassland LUS (78% of the area) followed by Cultivated</p>

<p>(LUS)</p>	<p>Commercial (8%) with Cultivated Subsistence comprising 5% of the total area. Preliminary results from the LADA National Assessment indicate that the area trend of the Cultivated Subsistence system is slowly decreasing (the area coverage is slowly decreasing in size) and the extent of degradation in the LUS is more than 60% of the area. For the Grassland LUS, National Assessment results indicate that the area trend is also slowly decreasing and that between 5 and 20% of the LUS area is degraded, mainly in terms of biological degradation.</p> <p>The land use in the study area includes communal grazing land, arable land and woodlots (for firewood). The arable land is dominated by maize and bean fields, followed by home gardens and a few community gardens. There is also a wetland area near the river used specifically for mud excavation for brick making to build houses.</p> <p>The land potential, and specifically the agricultural potential of a site, is determined by the combination of climate, soil conditions and slope prevailing in that region or site, resulting in the classification of areas with similar agricultural land potential. These land potential classes range from “High Potential” to “Low Potential”. The Agricultural Geo-Referenced Information System (AGIS) has mapped the agricultural potential of SA. Using this mapping shapefiles, it can be seen that the site as well as areas towards the east and south; the agricultural potential is classified as Moderate Potential Arable land.</p> <p>The site is currently zoned as “Agricultural”. This allows the property to be used for agricultural buildings and agricultural land.</p> <p>The site not is currently used for any purposes. The surrounding zoning and land uses are agricultural as well.</p>
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	<p><u>Impacts:</u></p> <p>Soil compaction.</p> <p>Possible soil erosion due to removed vegetation.</p> <p>Surface disturbance and topsoil removal.</p>
<p>Flora</p>	<p>The study area is situated in the Northam KwaZulu-Natal Moist Grassland. It is hilly and rolling landscapes supporting tall tussock grassland usually dominated by <i>Themeda triandra</i> and <i>Hyparrhenia hirta</i>. Open <i>Acacia sieberiana</i> var. <i>woodii</i> savannoid woodlands encroach up the valleys, usually on disturbed (strongly eroded) sites. In some places that are not disturbed, only scattered small wetlands, narrow streams alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover.</p> <p>A Threatened species and Species of Conservation Concern list for the Grids 2829CA was obtained from the Plants of South Africa (POSA) database on the South African National Biodiversity Institute (SANBI) website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered, Endangered and Vulnerable. Species of Conservation Concern include the Threatened Species, but additionally contain the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo et al. 2009). However, the POSA list is based on herbarium specimens housed in the National Herbarium of SANBI; therefore many plant species that do occur in the area are not listed.</p> <p>The following possible red data plant species (by the categories Critically Endangered, Endangered and Vulnerable) could occur in the areas surrounding the study area (according to the POSA database for grid 2829CA):</p> <ul style="list-style-type: none"> □ <i>Schizoglossum peglerae</i> N.E.Br.; □ <i>Protea subvestita</i> N.E.Br.

	<p><u>Impacts:</u> Stripping of surface vegetation during construction.</p>																										
<p>Fauna</p>	<p>The study area is stretched over a relatively large area. No Red Data Book Species were encountered.</p> <p>Possible smaller mammals that would commonly occur in the wider surrounding area are: Chacma Baboon (<i>Papio ursinus</i>), Caracal (<i>Caracal caracal</i>), Serval (<i>Leptailurus serval</i>) and Leopard (<i>Panthera pardus</i>). No Red Data Book species were recorded. There are also no records of red data (Critically Endangered, Endangered and Vulnerable) mammals for the wider area (2829CA).</p> <p>According to available literature, approximately 259 bird species occur in the Oliviershoek quarter degree grid cell (2829CA). The following Red Data species were recorded on site or flying over the site:</p> <ul style="list-style-type: none"> • Southern Bald Ibis (flying over site); • Cape Vulture (flying over site); and • Blue Korhaan (found on site). <p>According to Barnes (2000) and South African Bird Atlas Project 2, the following bird species are threatened in the wider area: List of possible red date avifauna on or near the site:</p> <table border="1"> <thead> <tr> <th>SCIENTIFIC NAME</th> <th>COMMON NAME</th> </tr> </thead> <tbody> <tr> <td><i>Ciconia nigra</i></td> <td>Black Stork</td> </tr> <tr> <td><i>Geronticus calvus</i></td> <td>Southern Bald Ibis</td> </tr> <tr> <td><i>Sagittarius serpentarius</i></td> <td>Secretarybird</td> </tr> <tr> <td><i>Gypaetus barbatus</i></td> <td>Bearded Vulture</td> </tr> <tr> <td><i>Gyps coprotheres</i></td> <td>Cape Vulture</td> </tr> <tr> <td><i>Stephanoaetus coronatus</i></td> <td>African Crowned Eagle</td> </tr> <tr> <td><i>Circus ranivorus</i></td> <td>African Marsh-Harrier</td> </tr> <tr> <td><i>Circus maurus</i></td> <td>Black Harrier</td> </tr> <tr> <td><i>Anthropoides paradiseus</i></td> <td>Blue Crane</td> </tr> <tr> <td><i>Balearica regulorum</i></td> <td>Grey Crowned Crane</td> </tr> <tr> <td><i>Eupodotis caerulescens</i></td> <td>Blue Korhaan</td> </tr> <tr> <td><i>Tyto capensis</i></td> <td>African Grass-Owl</td> </tr> </tbody> </table>	SCIENTIFIC NAME	COMMON NAME	<i>Ciconia nigra</i>	Black Stork	<i>Geronticus calvus</i>	Southern Bald Ibis	<i>Sagittarius serpentarius</i>	Secretarybird	<i>Gypaetus barbatus</i>	Bearded Vulture	<i>Gyps coprotheres</i>	Cape Vulture	<i>Stephanoaetus coronatus</i>	African Crowned Eagle	<i>Circus ranivorus</i>	African Marsh-Harrier	<i>Circus maurus</i>	Black Harrier	<i>Anthropoides paradiseus</i>	Blue Crane	<i>Balearica regulorum</i>	Grey Crowned Crane	<i>Eupodotis caerulescens</i>	Blue Korhaan	<i>Tyto capensis</i>	African Grass-Owl
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<i>Mirafra cheniana</i>	Melodious Lark														
<i>Lioptilus nigricapillus</i>	Bush Blackcap														
<i>Anthus chloris</i>	Yellow-breasted Pipit														
	<p>No Red Data species was recorded. And no amphibians or reptiles were encountered on site. This might be due to the lack of suitable or specialised searching techniques that is required, as well as the history of anthropogenic activities on site.</p> <p>List of herpetofauna possibly on site or rather in the wider area:</p> <table border="1"> <thead> <tr> <th>SCIENTIFIC NAME</th> <th>COMMON NAME</th> </tr> </thead> <tbody> <tr> <td><i>Cacosternum boettgeri</i></td> <td>Common Caco</td> </tr> <tr> <td><i>Cacosternum nanum</i></td> <td>Bronze Caco</td> </tr> <tr> <td><i>Strongylopus grayii</i></td> <td>Clicking Stream Frog</td> </tr> <tr> <td><i>Pedioplanis burchelli</i></td> <td>Burchell's Sand Lizard</td> </tr> <tr> <td><i>Trachylepis varia</i></td> <td>Variable Skink</td> </tr> <tr> <td><i>Trachylepis punctatissima</i></td> <td>Speckled Rock Skink</td> </tr> </tbody> </table> <p><u>Impacts:</u></p> <ul style="list-style-type: none"> • Removal of surface vegetation thereby depleting food sources. • Human presence resulting in emigration of animals. • The disturbances of the nearby vegetation cover and natural habitat will have a limited impact on the wildlife. However, it should be viewed against the background of the disturbances by human movement and activities through the area. 	SCIENTIFIC NAME	COMMON NAME	<i>Cacosternum boettgeri</i>	Common Caco	<i>Cacosternum nanum</i>	Bronze Caco	<i>Strongylopus grayii</i>	Clicking Stream Frog	<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	<i>Trachylepis varia</i>	Variable Skink	<i>Trachylepis punctatissima</i>	Speckled Rock Skink
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<p>Surface Water</p>	<p>There is no surface waterbodies onsite, only close to the site. The terrain contains some distinct topographical sections, namely:</p> <ul style="list-style-type: none"> • A small wetland, with small dams, and a drainage line in the eastern part of the property; • Drainage lines are also found in the western part of the property; • A DWS water scheme canal forming the southern and 														

	<p>western border.</p> <p>The flow over water over the area might be altered by the development through hard surfaces and the channelling of stormwater.</p> <p><u>Impacts:</u> Poorly implemented storm water system will result in increased surface run-off volume and speed, which could lead to the creation of erosion gullies. Storm water must be allowed to spread out gradually over a large surface area to protect the soil surface against erosion. Inadequate designed storm water outlets can lead to flooding of the road surface, adding unnecessary volume to effluent dams which is dangerous. Impacts on the wetland could be caused by the construction and operational phase.</p>
Ground Water	<p>Low use of ground water resources is anticipated. Currently there is no ground water available for the project.</p> <p><u>Impacts:</u> Low potential environmental impact predicted. Temporary toilets (chemical) left unmanaged can leak raw sewage and effluent into the soil, surface and even ground water sources, during the construction phase. Possible contamination of ground water from faulty or unmanaged effluent dams.</p>
Air Quality	<p>Dust will be generated by vehicular movements on site, the construction & operational phase.</p> <p><u>Impacts:</u> Low potential environmental impact. During the construction phase; dust could cause problems for nearby human settlements. During the construction phase the air quality will be the same as it currently is.</p>
Noise	<p>Noise generation by operating air compressors, excavators and</p>

	<p>other heavy machinery. Noise is also generated by the construction workers.</p> <p><u>Impacts:</u> Low potential environmental impact. Noise from the farm traffic will be an inconvenience to a certain extent for some existing properties nearby.</p>
Visual	<p>Visual and aesthetic elements are important. This proposed development will alter the visual landscape from agriculture fields/natural veld to a built-up area.</p> <p><u>Impacts:</u> No significant impact. This is all agricultural land and the proposed development is also agricultural. Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly.</p>
Sensitive Landscapes	<p>Sensitive landscapes identified will include the surrounding wetland and drainage lines.</p> <p><u>Impacts:</u> Low negative significant impact. Human presence resulting in possible emigration of animals. The movement of water to drainage lines further afield could be altered by construction activities.</p>
Sites of Archaeological and Cultural Interest	<p>During the site investigations, focus was also placed on the presence of any stone built structure, ruins, grave sites, complete built structures and the presence of artefacts. Based on preliminary observations some such features occur within the proposed area of development.</p> <p>A Heritage Impact Assessment (HIA), as part of the Environmental Impact Assessment stage of the application process, was conducted in accordance with the National Heritage Resources Act (Act 25 of 1999).</p>

	<p>A summary of the HIA investigations follows:</p> <p>The study area (Pig Housing Facility 3) does contain archaeological sites and material. The possibility of sub-surface findings always exists and should be taken into consideration.</p> <p>If sub-surface archaeological material is discovered work must stop and a heritage practitioner preferably an archaeologist contacted to assess the find and make recommendations.</p> <p>The study area does contain marked graves and burial grounds. The possibility of graves not visible to the human eye always exists and this should be taken into consideration.</p> <p><u>Impacts:</u> High significant impact could result if mitigation measures are not followed.</p>
<p>Socio-economic</p>	<p>This development will have a positive impact on the regional socio-economic structure through its support of the development industry, better local services support, job creation and the skills development of its employees and local community.</p> <p>This fully integrated development offers the shareholders the opportunity to assist in local upliftment through the following:</p> <ul style="list-style-type: none"> • Involvement of local contractors, • Job opportunities, • Skills training and development, • Social upliftment <p><u>Impacts:</u> Positive impact on the regional socio-economic structure through its support to the community, like: Job opportunities during the construction phase. Local economic boost.</p>

<p>Interested and Affected Parties</p>	<p>No comments received;</p> <p>Possible issues stemming from this development: Noise from construction & delivery trucks, and vehicles entering and exiting the site; Dust generation from construction activities;</p>
<p>Cumulative</p>	<p>The cumulative impact of the development on the social environment is positive. More job possibilities and economic boost for the local area.</p> <p>Seen at a wider scale the additional developments are not physically connected, but the removal of vegetation cover, such that the soil surface is exposed, may lead to increased soil erosion in the area and loss of habitat.</p>

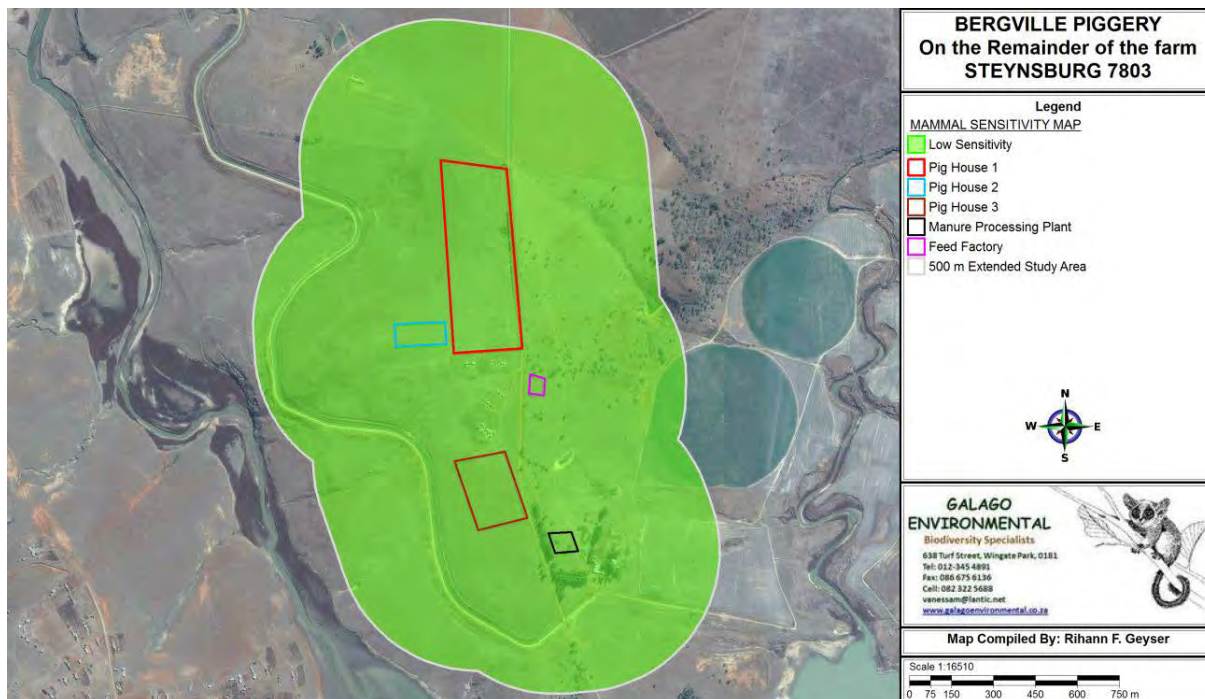
4. SENSITIVITY MAP

Also refer to Appendix 8 of the BAR.

The following maps show the sensitivity of the study area in terms of faunal species, flora and the aquatic ecosystem which include the wetlands and riparian areas. All these sensitivities are outside the proposed development footprint.

Fauna:

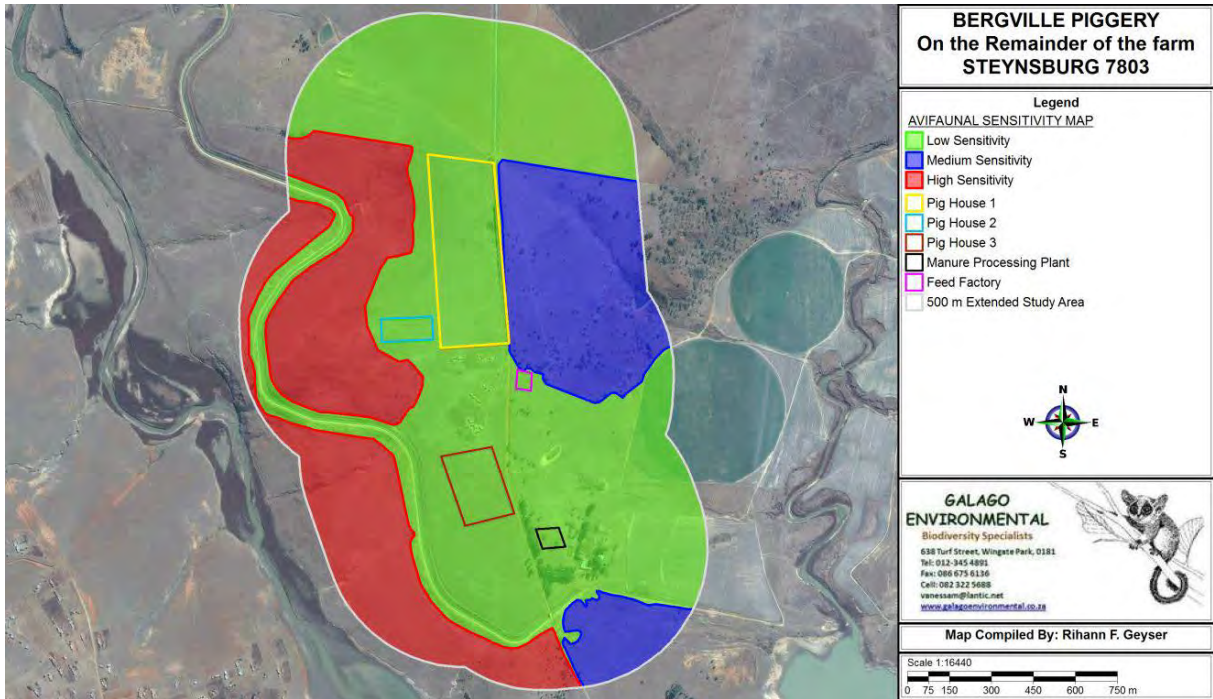
Mammals:



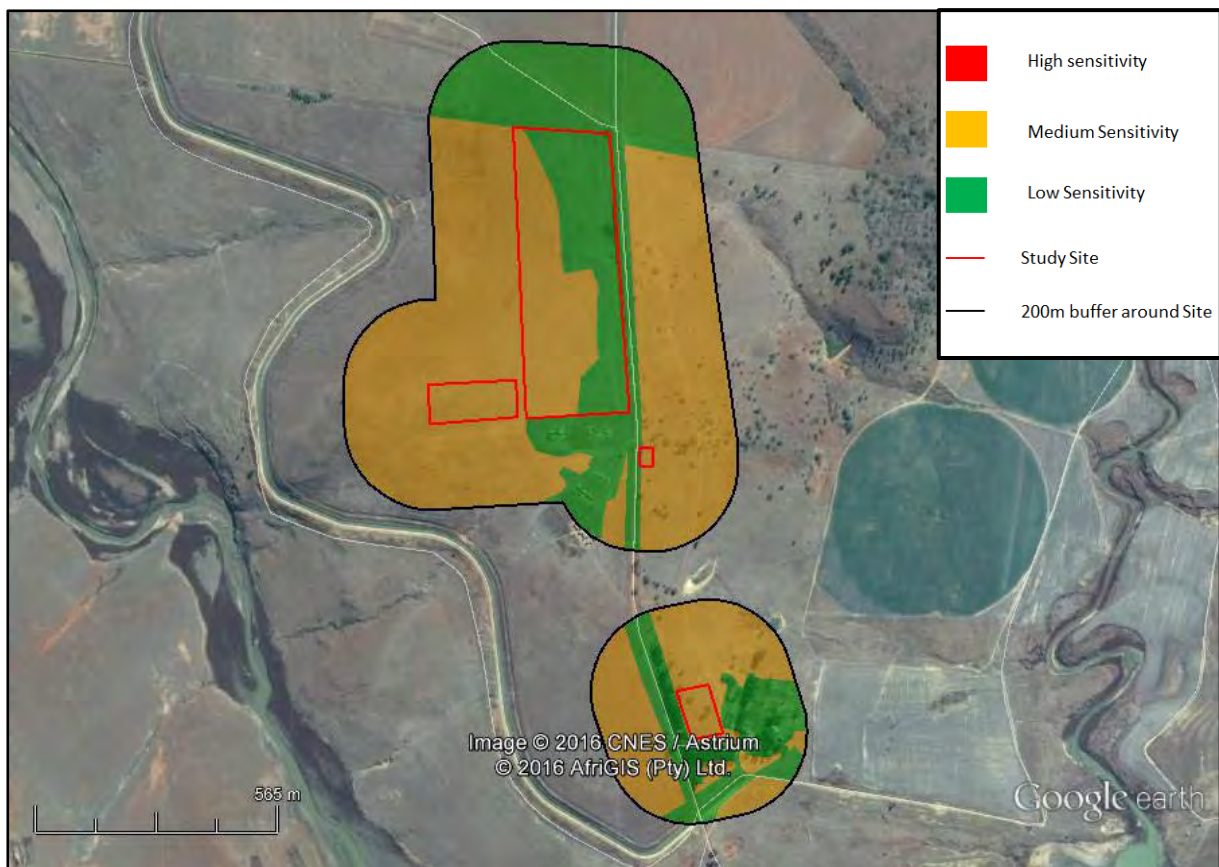
Herpetofauna:



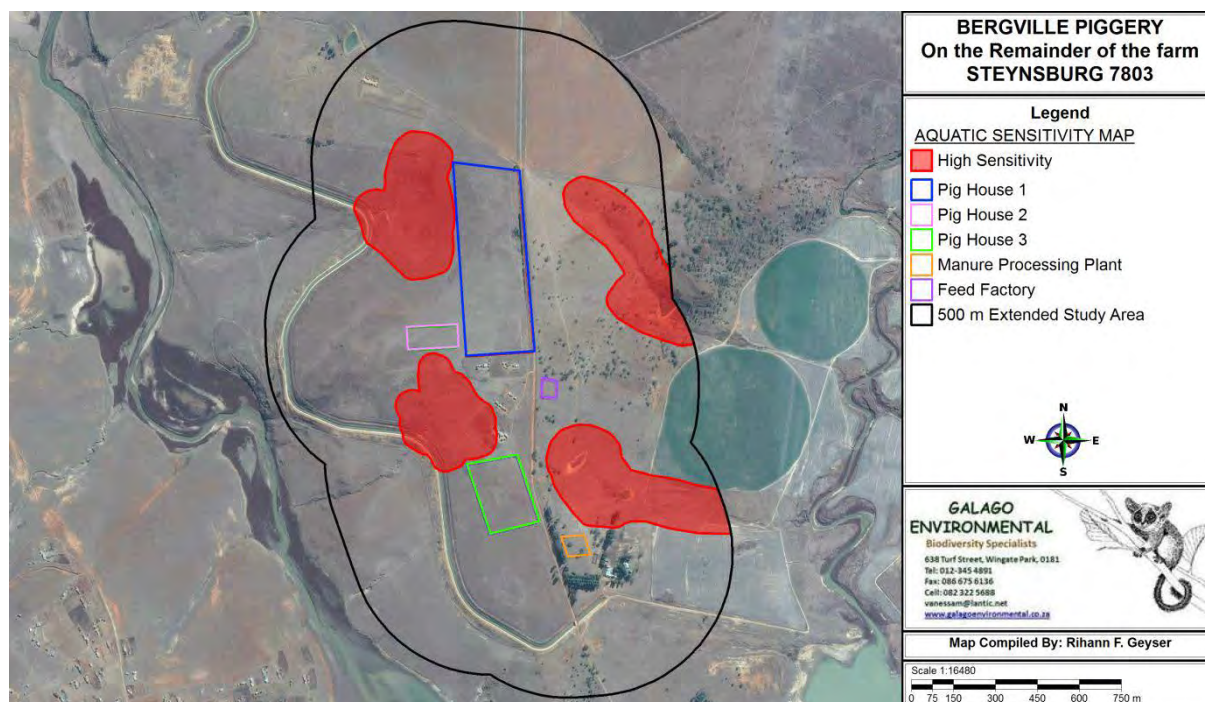
Avifauna:



Flora:



Aquatic Ecosystem:



5. DESCRIPTION OF THE IMPACT MANAGEMENT OBJECTIVES FOR ALL PHASES OF THE DEVELOPMENT

5.1 Recommendations applicable to the planning and design stage:

Time frame: 1 Month

There are a number of potential impacts that can be mitigated through careful design of technical/physical project components. The following design components are relevant in this regard:

- Address the potential contamination of surface run-off and soil through storm water drainage;
- Ensuring effective effluent management - to prevent potential contamination of soil and groundwater resources, as a result of insufficient or incorrect waste management systems by point source pollution;
- Visual and aesthetic impacts of the proposed development on the surrounding environment - landscaping will be an important component in this regard, as will the type and intensity of lighting used; and
- Waste management on site, including handling, storage and collection of solid waste and disposal of liquid slurry, with special reference to pig manure handling

5.1.1 Contamination of surface water/soil through storm water run-off from hard or paved surfaces

It is recommended that the storm water management system, leading from the paved surfaces be designed in such a manner that no direct link or piping be established into the natural drainage course.

Other precautions to be implemented in order to prevent storm water pollution are:

- Cover any wastes that are likely to wash away or contaminate storm water;
- Build a bund around waste storage area to stop overflow into storm water;
- Storm water outflows will not enter directly into a drainage line;
- Energy dissipaters (gabions/grass bales etc.) must be installed at all potential large flow volume areas, especially during the construction phase where large areas will be open soil;
- Natural storm water must not be piped other than in areas where it runs perpendicularly cross a roadway;

The Stormwater Management Plan also specifically addresses storm water to the satisfaction of the Local Council. Storm water design (as per civil engineers) for all hard surfaces will ensure the proper management and precautionary measures are taken into account.

5.1.2 Visual and aesthetic impacts of the building structure

The proposed development is built relatively close to recreational and business entities further away, which could be unattractive and undesirable in to such an environment. The proposed development, however, is situated in an agricultural setting. However, the character of the site and its location (rural/agricultural area) makes the proposed development acceptable and compatible with the aesthetics of the study area. Nevertheless, careful attention will be placed on various design elements associated with the proposed development, including attention to aspects that will enhance the aesthetic quality of a piggery, such as landscaping.

Poor maintenance of the facility as a whole will affect the visual and aesthetic quality of the area. Therefore, general building maintenance on a regular basis will form a crucial component of the operational phase of the proposed development. Generally, piggeries

have similar layouts, formats and appearances. Therefore, to pay special attention to “blending” the development to the environment is not a practical exercise. In terms of the level and nature of night illumination, carefully placed and downward shining lights are recommended to reduce this impact sufficiently. No high flood-lights should be installed on the site.

5.1.3 Waste management on site

Poorly designed waste collection/storage facilities have a significantly negative impact in terms of surface pollution, possible water pollution and negative impacts on the visual quality of an area. Therefore, practical design and efficiency is essential in this regard. The location of the refuse areas/waste collection area must be carefully planned and located so as not to cause a visual nuisance, as wind-blown refuse is often a problem. It is suggested that large black bins, which are secured in place, are distributed frequently at strategic locations across the site to discourage littering. The dustbins should be secured to prevent them from being knocked over or carried away. The lids should also be suspended permanently above the dustbins, to ensure that the waste disposed of is efficiently contained. The waste from these bins should be collected on a weekly basis and stored in a refuse collection yard (which should be contained within a walled fence), until such a time that a certified/registered contractor collects the waste - on a weekly basis - to be disposed of at a registered waste disposal site or when the farmer see fit to do it himself.

<p>Implementation responsibility: The site engineer / applicant will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2 Impact mitigation during the construction phase:

Timeframe: 4 Months

The following recommendations are proposed to assist as basic environmental management steps and to be implemented during the construction phase of the project:

The construction stage of the proposed development will cause minor impacts on the biophysical and social environment. Although these impacts are short-term and low significance in nature, it still is essential to address them as sufficiently as possible.

The following elements must be considered and addressed when the construction stage of the development commences:

- The locality of the construction camp and site offices (if used). Limited accommodation will be provided for construction workers. Staff will be limited to security personnel after normal working hours.
- The locality of stock pile areas must be confirmed and discussed with the appointed contractor before construction activities commence.
- Specified areas of access and movement by construction vehicles during the construction period are essential.

5.2.1 Management of impacts on vegetation cover and faunal habitats

Clearing/removal of the existing vegetation (which consists predominantly of alien/invaser vegetation) for the construction of the buildings will be necessary, however, due to the non-indigenous vegetation and size of the site, the significance of this impact is rated as low.

The propagation of exotic species and weeds will need to be controlled during the construction phase, as there are many activities on site that could lead to the establishment of weeds - including compaction of the soil by heavy machinery, construction waste, stockpile areas etc. Weed species should be removed on a four-week basis. Much of the site will be paved (either as parking areas or access roads) and a large portion will be landscaped. It is recommended that only indigenous species be used in the landscaping process, and that trees are incorporated into the landscaping design, if possible.

Weed species should be removed on a four-week basis. The site will not be paved and a large portion will be landscaped / maintained. It is recommended that only indigenous species be used in the landscaping process (if implemented), and that trees are incorporated into the landscaping design on the boundary of the piggery.

No specific mitigation measures are deemed necessary with regards to mitigating the impact of the proposed development on the faunal component, because the proposed area is small and disturbed. No mammal species were detected on the site. Avifaunal species were plenty.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.2 Soil stability and storm water management

If construction is to take place during the summer months, the terrain could be susceptible to sheet and gully erosion as a result of the slight angle of the terrain. However, in the event that additional access routes are required (at this stage such a requirement is highly unlikely), the physical layout of the access routes should follow the contours of the site wherever possible.

Aspects that typically impact on soil conditions are blasting activities, excavations for the founding of foundations, establishment of stockpile areas, removal and/or clearance of vegetation, movement of construction vehicles, and maintenance of construction vehicles, construction camp establishment and sanitation provision to workers during the construction period. Therefore, the following recommendations pertaining to soil conservation practices are made:

- Topsoil should be stockpiled separately from subsoil. The height of the stockpiles may not exceed 2.5 m and the stockpiles should not be stored for more than a one year period.
- Topsoil must be stripped from all areas, where construction activities are going to take place, to be re-used in landscaping the site.
- If any blasting activities occur on site, the blasted rocks and heavy rock material must be transported to an external venue. These rocks are not allowed to rest on site. If the rocks are left on site, the soil will be greatly compacted, which will promote the growth of weeds.
- Any excess overburden material that is generated may not be dumped in a random manner. Dumping sites should be predefined, agreed upon and adhered to.
- Any embankments created adjacent to the roads or any drainage lines must be stabilised during construction and re-habilitated afterwards.
- Generally, surface water must be prevented from damming or creating gully erosion. This can be achieved by placing sandbags along the boundaries of steep working areas where higher intensity surface run-off may occur.

- All rills and erosion channels developing during the construction period or during the operational and maintenance period should be backfilled and consolidated immediately.
- The movement and maintenance of construction vehicles may only take place in pre-determined and delineated areas. Only planned and formal routes for hauling of material should be used.
- Soil contamination during construction vehicle maintenance or as a result of fuel storage on site is easily prevented, but in the event of such an accident, the spill should immediately be cleaned up by absorbing the worst of the fluid with saw dust and then disposing of the saw dust and the first bit of the soil layer.
- Fuel storage areas should be bounded effectively and all applicable safety standards must be adhered to.

In terms of the stability of excavations, it is strongly recommended that all excavations exceeding 1.5 m should have proper sidewall protection to ensure the safety of workers. Seepage may result in the destabilising of the soils above the seepage and special precautions may be required. The contractor is responsible for the implementation of suitably designed support systems. Constructed embankments exceeding 1.5 m, or as deemed necessary by the design engineer, can be stabilised/protected by means of retaining walls. Embankments should be adequately compacted and protected from erosion.

The proposed development site is fairly flat; however, abnormal transportation of sediment during construction activities is possible. The following management measures must be implemented during construction. Abnormal soil erosion plays an important role in the siltation of watercourses and the loss of valuable topsoil. The following suitable storm water management and mitigation measures may therefore be necessary:

- Storm water run-off must be guided through appropriate drainage structures where needed. The engineering design will address the proper run-off of storm water and run-off must be handled in such a way that flooding of the access roads will not occur.

- Erosion control during construction is the responsibility of the contractor. The contractor will monitor the formation of erosion channels and repair as required to limit erosion damage to the works and the natural environment.
- The buildup of loose soil must be managed and limited, where possible, to reduce dust emissions. This can be achieved through the regular cleaning of road surfaces by sweeping these areas when necessary.
- Upon completion of construction at the site, all disturbed areas, not paved or landscaped, must be ripped and ploughed to enhance the establishment of natural grasses.

In addition to the above, the following restrictions will be enforced:-

- No borrow pit or quarry will be opened on site (highly unlikely). All imported material will be obtained from commercial borrow pits or quarries.
- The footprint of the various structures will be staked out prior to commencement of construction activities.
- No moving or removal of stones, plants or any other natural specimens will be allowed outside the staked construction area.

The construction of engineering services including any water, sewerage and underground electricity lines will require trenching and backfilling as per the engineering design. Where possible, all excavations of trenches shall be done by hand to limit the impact of excavators on site.

The following will be applicable where excavation done by hand is conducted:-

- Excavated material from the trenches along the driveways and walkways will be placed on the road surface or within the future road surface area and will not be allowed to be stockpiled in a nearby veld or adjacent vegetation.
- Trenches will only be as deep as required and be backfilled as soon as possible.
- The contractor will check all open trenches every morning for trapped animals.
- All open trenches will be demarcated clearly with danger tape, or as otherwise instructed by the Engineer.

The top 150 mm of backfilling will not be compacted and will comprise topsoil stripped from the area prior to opening of the trench.

Implementation responsibility: The main contractor and project engineer will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.3 Visual and aesthetic quality

Currently the study area comprises mostly natural vegetation. The visual quality of the area may be negatively affected, considering that the proposed development is an above-ground level development. However, to reduce the visibility of the structures, the following techniques should be implemented:

- Lamp posts and directional lighting is advised. Security lights should face away from neighbouring properties.
- Replacement of topsoil where necessary.
- Construction vehicles are not permitted to turn/drive into areas that are not designated for this purpose.
- No additional access routes may be established in the vicinity of any area where construction action is taking place.

Implementation responsibility: The site engineer will be responsible for the implementation of the above measures as an on-going process during construction phase. Hydro-seeding can be done by a contractor in this field.

5.2.4 Stockpiles and general storage of building material and equipment

Special care must be exercised when selecting the location of temporary material storage areas.

- Any excess soil or overburden material must be stockpiled to reduce visibility.
- Excess material that is not used during construction activities should be removed from the site to be used by other users in the construction industry.
- It is essential to place enough sand bags along the toe line of any loose material stockpiled and for the storage of building material.
- In the event of soil and overburden being removed from its locality, it should be stockpiled in a suitable place where, if possible, surfaces are already

disturbed and where the natural vegetation will not be covered by this material to a significant extent.

- Overburden or stock-piled material must only be stockpiled temporarily. No soil may be left exposed after construction activities have ceased.
- In the event of soil and overburden being removed from its locality, it must be suitably stockpiled away from any drainage ways.
- Overburden soil can alternatively be re-used in landscaping depending on the need.
- No material must in any event be dumped in any place in the surrounding region. Written proof of disposal at a waste disposal site must be given to the applicant and site manager on every load of construction waste removed from the site.
- No vehicle and equipment parking areas may be established within 20m of any natural drainage ways.

All stockpile areas should be ripped and ploughed at the end of the construction period to loosen soil surfaces for the natural propagation of vegetation and/or to allow for landscaping of the area. The same applies to other temporarily disturbed areas on site, which are vulnerable to the propagation of unwanted species (weeds). It is important that the contractor implements weed control through physical and/or approved chemical eradication methods. Only registered herbicides should be used to curb this problem.

The temporary storage of construction material and especially fuel must be carefully monitored by the site engineer to prevent the risk of accidental spillage or disposal of any such material that will contaminate soil surfaces, surface and subsurface water. All liquid material must, where applicable, be stored on solid concrete surfaces and must be surrounded by bunds. Bunding is also applicable to fuel and mechanical oil storage areas. Bunding walls should not be less than 30 cm high. Bunding walls must be able to contain 110% of the "unit's" capacity stored within it. Storage containers must be inspected regularly to prevent leaks that could contaminate the site.

<p>Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2.5 Community or public safety

The study area is situated in a rural area. Large construction vehicles, including trucks and other heavy machinery, will impact on road safety circumstances on the roads they use and it is the duty of the contractor to ensure that safety measures are implemented and adhered to.

The safety of the community throughout the construction period is of utmost importance. As road safety awareness is imperative, the following important actions must be noted that will assist in the management of safety during the construction phase where necessary:

- Adequate and correct caution signage and road marking during construction in accordance with the requirements of the South African Road Traffic Signs Manual and the CSRA / CUTA Road Signs Note 13. (Workers with red flags, visible workers and vehicles etc.)
- No soiling of road surfaces, causing accidents.
- A maximum of fifteen workers (if any) may be housed on-site, mainly to guard material and machinery. This will assist in managing and maintaining safety and security at appropriate levels.
- Names and identification numbers of each worker housed on-site must be provided by the contractor.

<p>Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2.6 Waste disposal and management

It is crucial to implement strict and effective waste control and waste management procedures during the construction phase. No littering by any personnel is permissible. The site manager/contractor should conduct regular site clean-ups to keep the site litter free - as litter is not only aesthetically displeasing, but it is also harmful to the environment. All domestic solid waste produced must be disposed of in waste bins situated on site. The bins should be emptied into a covered skip (for storage) on a regular basis, until its collection and removal to a municipal waste disposal site (preferably on a weekly or bi-weekly basis).

No liquid waste material should be disposed of on or near the site during construction, or in any non-designated areas. A firm arrangement must be made to place chemical toilets

on the construction site (within the construction camp to be erected). A sufficient number of chemical toilets need to be provided; in the range of 1 per every 8 workers. These toilets must be well maintained and inspected on a daily basis to ensure that they are clean and functioning properly. The toilets must be within walking distance from the work areas. No person is allowed to use any area, other than the chemical toilets provided, as a toilet. No washing of people and/or goods should take place on cleared surfaces, as this water should not be allowed to drain into any of the adjacent storm water canal.

In the event of accidental spillage of liquid substances, like paints and resins, it is important to implement the correct emergency procedures and cleaning-up operations. Pollution of surfaces should be limited at all costs.

The generation of construction waste occurs at every site under development and construction. Due to the costs involved in the disposal of this material at municipal or other licensed waste sites, the contractor or sub-contractor may be tempted to illegally dump waste at concealed locations to save on costs. Therefore, strict control is required from the main contractor on site to control this issue. Proof of disposal of waste material at a registered waste disposal site must be shown after off-loading of each waste load, which should then be logged or registered for control purposes. Control measures in terms of the National Building Regulations and standard requirements laid down by the local authority, with regards to spillage and waste disposal, must strictly be adhered to.

General waste disposal management involves the collection of construction waste at a central collection facility, which should be pre-arranged and implemented. This should include making points available for solid as well as liquid waste - including mechanical fluids disposed of during vehicle maintenance.

The site should be designed in such a manner that hazardous wastes are not located in close proximity to the permitted fire making area. These areas shall be predetermined and located in areas that are already disturbed. This area should be on a concrete base to avoid any possible seepage into the soil. All hazardous waste must be stored in sealed and suitably marked containers for removal to a hazardous waste landfill site by the contractor on a b-weekly basis. Hazardous waste could include used oils and fluorescent light tubes, as examples. The contractor should refer to the relevant Department of Water Affairs (DWA) guidelines for the classification of hazardous waste.

Implementation responsibility: The resident engineer and contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

Removal of waste from the terrain will be the responsibility of a certified waste contractor.

5.2.7 Dust suppression

During the initial construction phase it is anticipated that the generation of dust may occur. The management of dust generation during construction is of particular importance. Therefore dust suppression, as a normal daily practice, is essential. This can be achieved by:

- Watering and compacting of exposed surfaces where dust is generated. This must be conducted and strictly monitored. Such surfaces also include construction areas and unpaved access roads as part of the construction site.
- On rainy days this should obviously not be implemented to avoid access mud generation and water accumulation.
- In dry hot weather conditions water spraying must be applied twice a day on surfaces.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.8 Noise

Another important aspect is the control of noise pollution. This is achieved by implementing the following measures:

- Ensuring that machinery and trucks are well-oiled and maintained; this will make less noise than poorly serviced construction equipment.
- Silencers can be fitted to exhausts of heavy vehicles to limit the noise they produce.
- Lastly, construction hours should be confined to daylight hours of a normal working day, specifically from 7 am to 5 pm in the summer and 7.30 am to 5 pm in the winter.

- No activities should take place on Saturdays after 14:00 and no actions must take place on Sundays.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.9 Vehicle Maintenance and Fuel Storage

- Lubricants and mechanical oils or mechanical fluids must be collected in separate containers or drums to be collected by waste contractors for disposal at hazardous waste sites.
- Used oils that can be refined must be made available to companies for collection.
- These containers must not be placed in close proximity to any drainage ways.
- In the event of construction vehicle breakdowns or during routine maintenance checks, care must be taken to avoid oil, grease or any mechanical fluid spills within the study area. Vehicles may not be serviced in or adjacent to the road reserve of the study area, thus servicing must be limited to the designated areas or workshops.
- No temporary fuel storage tanks or containers may be erected near drainage courses and refueling must be done by means of a fuel bowser.
- Fuel storage areas must be bunded effectively and all applicable safety standards have to be adhered to. The bunded area around the fuel storage areas should be able to contain 110% of the volume of the fuel container inside it.
- All fuel storage areas must be fenced and secured.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.10 Archaeology and Cultural Sites

- Should archaeological objects of any nature (including fossils, graves or remains of structures) be found, the developer will stop all construction activity, and notify Rock Environmental Consulting, immediately. The

Provincial Heritage Resources Agency (PHRA), AMAFA, will be consulted for further investigation and clarification.

- All finds of human remains must be reported to the nearest police station.
- Human remains or any burial ground or part thereof that are deemed to be of cultural significance may not be destroyed, damaged, altered, exhumed or removed from their original positions without a permit from the PHRA.
- Work in areas where artefacts are found must cease immediately.
- Under no circumstances must the Contractor, his/her employees, his/her sub-contractors or his/her sub-contractors' employees remove, destroy or interfere with archaeological artefacts. Any person who causes intentional damage to archaeological or historical sites and/or artefacts could be penalised or legally prosecuted in terms of the National Heritage Resources Act, 25 of 1999.
- A fence at least 2 m outside the extremities of the site must be erected to protect archaeological sites.
- All known and identified archaeological and historical sites must be left untouched.
- Work in the area can only be resumed once the site has been completely investigated. The Project Manager will inform the Contractor when work can resume.

<p>Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2.11 Construction camp establishment

- Workers that are allowed to live on-site should be kept to minimal numbers. Those workers present at night should be on site only to look after construction equipment and to take register of the workers present on site to eliminate crime in the area.
- Any temporary structures will be soundly built and will not pose a danger to personnel.
- The contractor must supply cooking facilities (preferably gas) if labourers are to be housed at the site.
- No fires will be permitted outside the construction camp and adequate firefighting equipment, which complies with fire and safety regulations, must

be available at the construction camp site at all times (at least one all-purpose 12,5 kg extinguisher)

- Chemical toilets to be supplied at the construction camp for labourers accommodated on site. They may also use existing facilities on site.
- Welding, gas cutting or cutting of metal will only be permitted inside the construction camp.
- The contractor will supply 210 litre drums at the construction camp, as well as at the construction site, for the storage of domestic waste.
- Recyclable waste including glass, paper and plastic shall be separated at the construction camp, stored and recycled (where economically feasible).
- Waste must be removed on a weekly basis to a registered waste disposal facility, or through the utilisation of existing municipal waste removal systems.
- As far as possible, local labour should be employed during the construction period.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.12 General rehabilitation of the construction site

It is important that rehabilitation will commence as soon as feasible on each of the construction areas to run concurrent with the construction phase and not to be left until completion of the works. This will increase the chances of successful rehabilitation.

All areas disturbed by development activities will be rehabilitated on completion of the construction phase. The following general procedure will be followed:-

- Removal of all construction facilities and materials from site, cleaning up of any remaining oil or other spills and removal of all construction waste from site;
- Shaping of the disturbed areas to blend with the surrounding landscape;
- Placing of topsoil on all disturbed areas (minimum depth 150 mm);
- Organic fertilizers must be added to the topsoil prior to seeding (if required).
- Re-vegetation of all areas where topsoil is placed using a mixture of indigenous grasses and bushes;

- Maintenance of these areas until an acceptable cover has been established. Acceptable cover shall mean 75% ground cover with no gaps exceeding 500 mm. Maintenance may include watering, mowing and weeding as well as preventing the development of erosion channels or, backfilling where they have occurred.

5.2.13 Stockpile Areas

Once stockpiles have been removed the ground surface is to be inspected for compaction. Should it be required, the surface is then to be ripped and the prescribed re-vegetation process followed.

5.2.14 Rehabilitation of Construction Camps

Rehabilitation will be necessary in the following areas:

- Concrete and compacted earth platforms;
- Removal of fuel storage tanks;
- Removal of chemical toilets; and
- Access roads running into and through the camps.

Concrete platforms will need to be broken up and rubble removed. The prescribed re-vegetation process must then be followed.

5.2.15 Re-vegetation Process

The basic re-vegetation steps which will be implemented where and if required are detailed below:

Step 1: Prepare the area to be re-vegetated for top-soiling - this may require soil ripping, scarifying and/or digging of steps or terraces. The scarification should take place to a minimum depth of 150 mm. If ridges are formed, they should be approximately 100 mm high and 400 mm wide.

Step 2: Stockpiled topsoil must be placed on areas to be re-vegetated to a minimum depth of 100 mm, spread when dry by means of hand raking or mechanical means to a uniform thickness.

Step 3: If required when sodding or hydro seeding, appropriate organic fertilisers must be applied and worked into the soil to a minimum depth of 150 mm.

Step 4: Fresh, good quality seed - which is certified by the supplier and free from contamination by seeds of other species - can be used for the re-vegetation process, although seed harvested from site is preferable. The rehabilitation grass seed mix will be seeded at a minimum density of 30 kg/ha, utilising a mixture of suitable species. The mixture must also always include at least one legume species.

Step 5: Mulch should be applied to protect the seeded area from erosion. The mulch should be composed of straw or other cellulose-rich material and free of undesirable seeds. The mulch must not be excessively fresh and green or in an advanced state of decomposition as it could smother growth. It must be applied to a depth and density that will prevent erosion by wind and water, but not completely block out the access of sunlight to the soil or prevent penetration by young plants.

Step 6: Re-vegetated areas are to be enclosed within an erected safety barrier to prevent excessive trampling and any other factors that might cause erosion or compaction. No road building equipment, trucks or other heavy equipment will be permitted onto re-vegetated areas.

Step 7: Re-vegetated areas must be irrigated on a regular basis, or as required.

Step 8: An appropriate maintenance and monitoring program must be implemented. This program will include monitoring of the success of seed germination, growth of the plants, removal of invasive weeds, replanting of areas where re-vegetation has not been successful once the cause of the inhibiting factor has been identified and remedied, and repair of any funnels or erosion channels.

5.3 Operational phase:

Timeframe: 20 years plus

Responsibility: The applicant will be responsible for the implementation of the measures as an on-going process during operational phase.

Mitigation of impacts during the operational phase is of great importance, as there are long-term issues that are of relevance.

5.3.1 Waste Management of domestic solid waste

- General waste generated during the operation of the piggery must be collected in waste bins that are emptied on a regular basis into a central waste collection facility.
- General waste is to be collected on a regular basis to be emptied at the nearest municipal solid waste disposal site. The products that will typically be generated are general refuse such as empty food cans, leftover foods, paper, plastic and bottles.
- Recycling is always desirable and if the separation of waste can be encouraged and implemented, this would be highly beneficial.

5.3.2 Waste management of pig manure slurry from piggery to storage tanks/damns

The plug and flush system (if used) should be maintained to ensure that no blockages occur that could result in overflow and concentrated point source pollution.

Manure slurry should be diluted to only contain 5% solids, therefore:

- Weaner houses slurry densities calculate to 8% and needs to be diluted with a certain amount (depending on the number of pigs) of top up water per week to reach 5% solids.
- Grower houses calculate to 27% and need to be diluted with a certain amount (depending on the number of pigs) of top up water per week to reach 5% solids.
- The weaner houses should be emptied every 6 weeks and totally flushed out through the pull and plug system.
- The weaner houses should be emptied every 12 weeks and totally flushed out through the pull and plug system.
- A high pressure washer should be used to wash out the houses.
- After thorough washing the houses should be disinfected with a special disinfectant to prevent the occurrences of disease.

5.3.3 Waste management of mortality pits

Increased public concern for the environment and resulting stricter regulations governing the disposal of mortalities present new challenges. The usual way of dealing with carcasses in the past was by burial or incineration. Buried animals can contaminate ground water and smoke from incineration contaminates the air. In most cases currently pig carcasses are

disposed of on the farm itself, thereby promoting bio-security and the prevention of collection trucks entering the farm grounds.

Composting is an inexpensive and environmentally friendly way to dispose of carcasses. Composting uses waste products (for example carcasses) and converts them into an odourless, inoffensive product (as well as water and carbon dioxide) that can be used as a soil amendment or organic fertilizer. This is achieved by adding special enzymes and microscopic organisms to the carcasses. The synergistic action between bacteria, fungi and actinomycetes result in the production of carbon dioxide, water, minerals and a stabilized organic matter called humus, which can be used as a fertilizer. The construction of a concrete / clay lined pit with a Perspex-like glass cover is the best technique to achieve composting.

- The Perspex-like glass cover should have tiny insertions with funnel attachments to allow flies from the surrounding environment to access the carcasses. This will be a natural process as flies will automatically be attracted to the odour, enter the pit and will then be trapped, like in a huge fly-trap. The flies will then be decomposed in the same way as the pigs.
- Such a system will not allow any possible detrimental fluids into the surrounding soil or the percolation of any fluids to the water table.
- The dome should be covered with a semi-transparent Perspex which covers the pit to allow sunlight to enter the pit and supply the necessary energy for the digestive process, while at the same time preventing odours and flies from escaping out of the pit.
- Mortality pits should be completely lined with concrete / clay and have a dome on top with a fly trap.
- When a dead pig is placed in the pit bio-enzymes are added according to manufacturers' instructions per kg of pig. The bio-enzymes are not harmful to the environment, have been specially developed by biotechnology companies for this purpose and are commonly known as 'mortality pit accelerators'
- By using this type of product the farmer will reduce bad odours, flies and increase the life of the mortality pit. The carcasses take approximately 4 months to decompose.
- Storm water generated on the composting site must be diverted to the effluent treatment ponds.

- The mortality pits should be managed properly and therefore should not emit strong smells

A different technique regularly used in the US is:

Mortality composting is begun by placing a 30 cm layer of cover material (wood shavings) in the bottom of the bin (a bin is built from treated wood, concrete or bales of hay, over a concrete floor with a tin roof) (please refer to the attached articles for drawings and images). Decaying carcasses release excess moisture, so a thick absorptive base layer (wood shavings) plays an important role in preventing release of excess liquid. Carcasses placed in the composting bins should not touch each other and should be at least 22.5 to 30 cm from bin walls. Too many carcasses in one spot leads to localized wet spots and poor decay. Carcasses that are too close to the cool exterior side walls of the bin will decay slowly and are less likely to be exposed to the high temperatures necessary to kill disease-causing microorganisms.

After a layer of carcasses has been placed in the bin, according to the article, 15 to 22.5 cm of cover material must be added. Complete coverage is essential to avoid problems with insects, rodents, and scavengers. Daily layering of new carcasses and cover material continues until the bin is filled to a depth of about 1.6 m. In some instances, it may help to segregate large and small carcasses in separate bins. This allows smaller carcasses to move through the treatment process quickly, minimizing the amount of bin space tied up in lengthy treatment cycles. To ensure continuous coverage throughout the composting cycle the article refers to the fact that it may be necessary to add cover material from time to time as material within the bins settles. This is particularly true when large carcasses are composted. In a properly operating facility, new material added to bins reaches temperatures of 50 to 65°C within 24 to 48 hours. Internal temperatures can be monitored with a long stemmed (90- to 120-cm) composting thermometer.

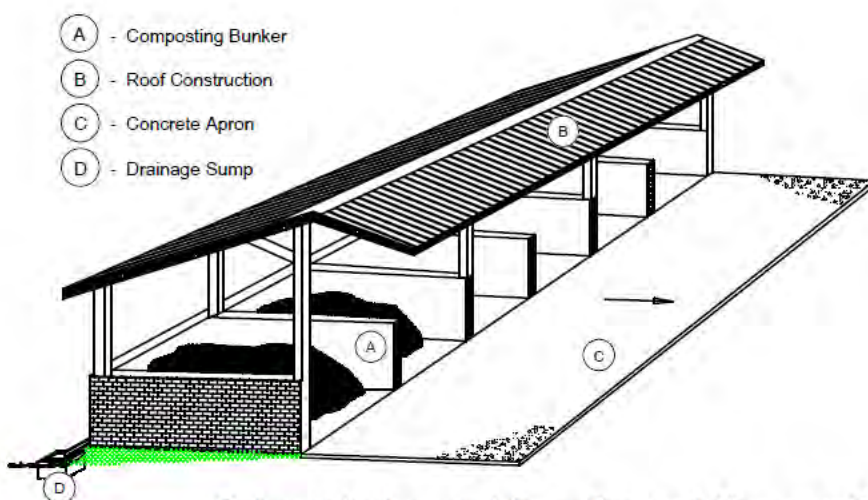
For an accurate picture of internal conditions, probe the bin at several locations. It is normal to find hot and cool spots within the same bin, so a single temperature measurement can be misleading. If a bin fails to heat up, too much or too little moisture is the most common cause. It may be necessary to unload the bin and mix-in compost from an active (hot) bin to remedy the problem. After a bin is completely filled, it must undergo a primary heating cycle of 60 to 90 days. The length of the primary heating cycle will vary with the size of carcasses placed in the bin. For farrowing house and nursery losses, an

initial heating cycle of as little as 30 days may be adequate. If the bin is filled with larger market-weight animals or breeding stock, primary heating cycles as long as 6 months may be necessary.

Following the primary heating cycle, the partially composted carcasses are removed from the primary bin and placed in a secondary bin. The mechanical action of moving the compost breaks up the pile, redistributes excess moisture, and introduces a new oxygen supply. Once this takes place, a secondary heating cycle occurs, accompanied by further decomposition.

By the end of a 60- to 90-day secondary heating cycle, even large carcasses of breeding stock are normally reduced to a few large bones that are free of soft tissues which cause odours or attract insects and predators.

An example of the composting facility below:



Schematic Lay-out for a Fenced Carcase Composting Facility

5.3.4 Water usage

- | | |
|---|--|
| <ul style="list-style-type: none">• The water used that is supplied from onsite bore holes should be carefully managed to ensure that water extraction does not exceed the maximum amount allowable as indicated on the water licence application.• The water to the houses should be under constant pressure to ensure sufficient water supply to the pigs. | |
|---|--|

5.3.5 Feed systems and ventilation

Each pig house will have systems for supplying feed and water for the pigs. The sides of the pig houses can be opened for ventilation when necessary.

<ul style="list-style-type: none"> • All the feed will be milled and mixed on site. Dust from milling has to be monitored and kept under control to prevent explosions. • If Mielies are stored (on-site) in a silo prior to milling, then silos have to be maintained to ensure that no leakages of mielies could occur. • If the mielies are milled onsite with a Tolkman hammer mill, then all safety procedures have to be put in place to ensure that no injuries take place. 	
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5.3.6 Noise impact management

The location of the proposed development is adjacent to various farming practises. The significance of the noise impact associated with the proposed development during the operational phase of the piggery is moderately negative. Noise will be generated by the movement of vehicles such as delivery and pick-up trucks within the piggery and the opening and closing of the security gate entrance. The following noise impact mitigation measures can be implemented:

<ul style="list-style-type: none"> ⇒ The security gate entrance should be well-oiled at all times to prevent excessive noise. ⇒ Speed limits should be enforced within the complex (speed bumps are one way of ensuring this), not only in terms of reducing noise levels, but also to ensure the safety of workers on the Piggery. ⇒ Deliveries and pick-ups with large trucks should be limited to twice a week on predetermined days of the week. ⇒ Intentional disturbances to the pigs should be avoided to keep them calm, therefore making less noise. 	
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5.3.7 Compliance to standards

Compliance to all relevant regulatory standards and codes of practice is essential. An assurance that the development will comply with the relevant regulatory standards and codes of practice will be enforced by the Environmental Authorization to be issued by the GDARD, providing that authorisation for the proposed development is granted and also in terms of NHBRC guidelines, to which all building and services will comply.

Standards for Piggeries should be adhered and complied to.

Implementation responsibility: The applicant will be responsible for the implementation of the above measures as an on-going process during operational phase.

5.3.8 General provisions

Disposal of hazardous waste should be separately handled from domestic waste. This will help to prevent water and soil pollution. Hazardous waste includes substances such as paint, chemicals, razorblades, needles etc.

Implementation responsibility: The applicant will be responsible for the implementation of the above measures as an on-going process during operational phase. The applicant expressed his willingness to participate in this regard.

5.3.9 Irrigation of slurry/treated effluent onto agricultural fields (if applicable)

If the slurry is to be irrigated into the lands, then following applies:

Shallow water penetration

The water portion of the effluent should never be allowed to penetrate deeper than one metre into the soil. That depth is allowed as the maximum depth to which oxygen readily penetrates the soil. This should be done as the soil organisms normally act in a rapid manner to first metabolise gaseous compounds and within a short period to oxidise the nitrogenous compounds emanating from the urea, ammonia, amino acids and other nitrogenous compounds in order to convert them into nitrite and further onwards to nitrate

5.3.9.1 Immediate covering of the effluent after application:

- When the effluent has been applied to the crop field it should be covered with soil immediately to:
 - o prevent the escape of beneficial gaseous compounds needed in the soil,
 - o to prevent too much ultra-violet irradiation of the effluent as certain fungi which thrive on the organic material and attack nematodes in the soil, can be killed,
 - o To prevent unwanted odours to float into the atmosphere and to cover crop seeds which have been spread into the furrows just prior to the application of the effluent.

5.3.9.2 *Wetting the soil profile to field capacity:*

- The amount of effluent to be applied to the crop field should be in accordance with the water needed to bring the soil profile to field capacity and not allow for significant amounts to percolate as free water into deeper soil horizons.
- Total amount of water required on 1 hectare per year to bring the soil to field capacity is 14 000 cubic metres. Therefore, the irrigation onto the lands should be less than this figure.

5.3.9.3 *Irrigation measures*

- Prior to application of the effluent the land should be ploughed, disc harrowed or furrows. The equipment is inexpensive and easy to use.
- The effluent should be piped onto the crop field by the use of simple quick-coupling irrigation pipes
- The correct amount of effluent should then be piped into the length of the bottom of the furrow and each pipe section removed after the furrow has been wetted for the length of the pipe section
- A few minutes should be allowed after application of the effluent for the water to penetrate into the soil
- Immediately afterwards some soil from the ridges of the furrow should be scraped into the bottom of the furrow in order to cover the wetted portion of the soil
- This procedure can be repeated to the high end of each furrow and can be repeated every 14 to 21 days
- Crops and or grass can be planted on the same time and seeds should be inserted into the furrow before it is closed up.

With the above-mentioned method of effluent dispersal, the soil conditions can be expected to improve drastically, together with the nutritive capacity of the soil.

5.3.10 Disease/Biosecurity management in general

5.3.10.1 *Movement/access control*

- Pigs: The closer one can operate to the ideal of complete "all-in-all out", the better. Even where the farm design or infrastructure forces us to follow multi-age production strategies, one can achieve major advantages by dedication of houses to more uniform groups, adjusting the schedule of movements between houses, etc. Managers, etc. that

have to visit different sections should always move from young to old, not vice versa. Older pigs have developed immunity to agents that will still infect the young ones. Sections can be "colour coded" to reflect this e.g. farrowing houses = Red; Weaner houses = Yellow; Older pigs = Green. Coloured overalls that reflect this scheme can allow the manager to immediately spot workers breaking the "best practice" rules. This procedure is common on poultry breeder farms and high health status pig herds.

- People and other animals/birds: Management, labourers, visitors; showers, washrooms, dedicated (different colours!?) overalls & rubber boots; continuous rodent control, bird unfriendly infrastructure, no use of untreated surface water for either washing or drinking (wild birds, especially waterfowl can spread several diseases transmissible to pigs).
- Vehicles: Staff, visitors, feed/pig delivery-, or collection of slaughter ready pigs. Dedicated parking spaces and drive areas should be demarcated, signposted and its use enforced! Wheelbaths and/or spraying of vehicle undercarriages can also be used at the main entrance. No delivery/collection truck should physically enter the area where pigs are kept. The practical challenges of feed storage and distribution will be different on every farm, but these should not be adapted for convenience while every delivery/collection truck is allowed to spread diseases from other farms and abattoirs. Remember that even healthy porkers/ baconers can carry/temporarily shed disease agents that can infect younger pigs.
- Airborne diseases and Ventilation Management: Ideally houses should be sited far enough from each other so that faecal dust from older pigs (or other farms) cannot be blown into houses with younger pigs. In practical terms this means lumping similar ages together, taking prevailing/dominant wind direction into account.
- Waterborne diseases and water reticulation system associated health risks: The water reticulation system builds up its own, complex microflora over time, and this biofilm can act as residual populations of many disease agents. The water reticulation system should be cleaned (using a degreaser/ descaler) and then disinfected, at least twice a year at the beginning and end of summer. Some older farms will need to do it more often. These agents are often implicated in diarrhoea/enteritis in young pigs.

5.3.10.2 Create a barrier/buffer

- Time = "quarantine"; = separate new arrivals from the others, dedicate houses/sheds to those, do not mix old and young (applicable to gilts and older sows also!). As long as practically possible; ideally 2 weeks plus.
- Space/distance; see discussions above.

5.3.10.3 Effective immunization

- Correct vaccine choice; diagnostic procedures should be followed on all mortalities and coordinated with your Veterinary Consultant.
- Correct timing of vaccination; allow vaccines to stimulate protective responses before the major challenges occur. Make use of abattoir lung lesion scoring and other organ evaluation techniques.
- Correct vaccination technique; train workers to understand the reasons behind what they are doing, vaccine handling, and injection techniques. Monitor the number of doses used against the expected volume used. Record this in your "Pharmacy Data Base" where you also record all antibiotic use and generally keep track of all medical stocks.

5.3.10.4 Efficient hygiene and disinfection

- Choice of disinfectant(s); Evaluate chemicals based on efficacy data against targeted index organisms, safety data, non-corrosion data, and then calculate the cost per working litre to make your final decision. A single compound will seldom be the disinfectant of choice for all applications.
- Correct application: concentration and contact time; automate the mixing/ dilution procedures to avoid human error. Monitor disinfectant use against expected volumes of concentrates used.

Biosecurity Plan (designed in close conjunction with a State Veterinary Consultant - letter is attached)

- A written, dynamic document stipulating the "best practice" standard operating procedures that will be followed on the particular pig farm

- HACCP: Identify the practical, critical control points
- Monitor these,
- Regular review and adjustment where necessary of plan/document.

The client must contact a veterinary practice to help manage and implement a biosecurity plan for the piggery and also do monthly inspections as part of the biosecurity plan.

5.4 Closure phase

Timeframe: 5 months

Responsibility: The applicant will be responsible for the implementation of the measures as an on-going process during closure phase.

- The physical and chemical stability of the remaining structures on site should be appropriately secured.
- The site should be securely fenced off and all remaining structures securely locked up.
- The physical integrity of the remaining structures on site should under no circumstances be allowed to deteriorate to an extent that makes the site visually unpleasant.

6. PROPOSED MECHANISMS FOR MONITORING

It is recommended by the Environmental Practitioner that an Environmental Control Officer (ECO) be appointed by the applicant. The ECO will be the person involved with the development of the project and also be responsible for the monitoring of the implementation of the EMPr. It may be different parties during the different phases of the project.

- This person may be appointed by the appointed engineer or indirectly by the applicant/client. It must, however, be a person with adequate technical and

environmental knowledge to understand and implement this management programme.

- The ECO may not be someone appointed by the contractor.
- The ECO must report to the applicant on a regular basis or frequency.
- The ECO has the authority to stop works during construction if in his opinion there is a serious threat to, or impact on the environment caused directly from the construction operations. This authority is to be limited to emergency situations (see definitions) where consultation with the engineer or developer is not immediately possible. In all such work stoppage situations the ECO is to inform the engineer and developer of the reasons for the stoppage as soon as possible.
- Upon failure by the contractor or his employees to show adequate consideration to the environmental aspects of this contract, the ECO may recommend to the engineer to have the contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied. No extension of time will be considered in the case of such suspensions and all costs will be borne by the contractor.

Monitoring will be done on monthly, weekly or quarterly basis and a report will be submitted to the relevant authority for checking compliance with the EMPr. This report will give a point scale of implementation measures. This may be the construction site manager, contractor, safety officer, and engineer.

CONSTRUCTION PHASE

MONITORING TYPE	FREQUENCY			
	DAILY	WEEKLY	MONTHLY	QUARTERLY
WEED ERADICATION			X	
EROSION CONTROL			X	
WASTE MANAGEMENT		X		
DUST CONTROL	X			
NOISE MONITORING	X			
SAFETY	X			

BOREHOLE				X
HAZARDOUS SUBSTANCE			X	

Compliance with the EMPr was rated according to the system detailed below:

SCORE	COMPLIANCE RATING	DEFINITION
4	Full Compliance	All requirements and conditions have been addressed.
3	Substantial Compliance	Between 75 and 100% met
2	Broad Compliance	Between 25 and 75% met
1	Partial Compliance	Less than 25% met
0	Non Compliance	None of the requirements and conditions has been addressed.

Outlined below are a number of steps, relating to increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

Step 1: The ECO discusses the problem with the contractor or guilty party, and they work out a solution together. The ECO records the discussion and the solution implemented. This detection together with the solution will be included in the monthly monitoring report.

Step 2: The ECO observes a more serious infringement, and notifies the guilty party in writing, with a deadline by which the problem must be rectified. All costs will be borne by the contractor. This incident will be included in the monthly monitoring report.

Step 3: The ECO shall order the contractor to suspend part, or all, the works. The suspension will be enforced until such time as the offending party (ies), procedure or equipment is corrected and/or remedial measures put in place if required. No extension of time will be granted for such delays and all cost will be borne by the contractor. The Department of Environmental Affairs shall be involved and penalties will be allocated. In

this time the department can decide to submit a pre compliance notice and has authority to withdraw the Record of Decision.

7. ENVIRONMENTAL AWARENESS PLAN

7.1 Training programmes:

1. Occupational Health and Safety (OHS) - Done internally by Health of Officer.
2. Personal Protection Equipment (PPE) - Done internally by Safety Officer.
3. Environmental training
 - a. program 1 - Introduction to Environment, Ecosystems and Habitats. Including symbiotic interactions.
 - b. program 2 - Environmental Degradation, Soil, Air, Noise, Water and Ground water Pollution. Erosion.

Programmes 1 and 2, the OHS and PPE training is something that is done either annually or bi-annually depending on the need identified by management of the development. The environmental training and awareness will be implemented a.s.a.p. before the construction phase begins. Management will also arrange for training bi-annually for 2 to 4 hour sessions at a time. Training will either be done internally or externally. Internal training will be done by the Environmental Management Department and externally training providers will be sourced as approved by the owner of the site.

7.2 Monitoring of awareness

Bi-monthly Health and Safety meetings are held where relevant issues regarding health, safety and environment are discussed and feedback is given. Environmental awareness should be incorporated into the compulsory 'Tool box talks' that include health and safety issues. These should be done on a monthly basis.

8. RECOMMENDATION FROM SPECIALISTS & STAKEHOLDERS

8.1 Heritage Impact Assessment:

The study area (Pig Housing Facility 3) does contain archaeological sites and material. The possibility of sub-surface findings always exists and should be taken into consideration.

If sub-surface archaeological material is discovered work must stop and a heritage practitioner preferably an archaeologist contacted to assess the find and make recommendations.

The study area does contain marked graves and burial grounds. The possibility of graves not visible to the human eye always exists and this should be taken into consideration.

It is important to note that all graves and cemeteries are of high significance and are protected by various laws. Legislation with regard to graves includes the National Heritage Resources Act (Act 25 of 1999) whenever graves are 60 years and older. Other legislation with regard to graves includes those when graves are exhumed and relocated, namely the Ordinance on Exhumations (no 12 of 1980) and the Human Tissues Act (Act 65 of 1983 as amended).

If sub-surface graves are discovered work should stop and a professional preferably an archaeologist contacted to assess the age of the grave/graves and to advice on the way forward.

Recommendations from the Heritage specialist:

- It is recommended that an Archaeological Impact Assessment (AIA) be conducted on the Pig Housing Facility 3 site to determine archaeological significance and mitigation.
- It is recommended that graves are preserved in situ. If this best practice scenario cannot be achieved the correct processes and procedures must be adhered to in regard to exhumation, relocation and reinternment of skeletal remains.
- All structures older than 60 years are protected by the National Heritage Resources Act (Act 25 of 1999). If structures older than 60 years are to be demolished the necessary permission must be obtained from the provincial heritage authority.
- The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Programme. See 3.2.6 and 3.2.7 of the HIA.

8.2 Geo-hydrological:

The following recommendations are made:

- Boreholes BH 5 and BH 6 can be used for domestic purposes without treatment.
- It is recommended that surface water be used to supply in the water demand for the planned piggery site.
- Storm water originating from the piggery site must be treated as dirty water.
- Clean water and dirty water systems must be separated.
- Storm water must be directed away and around the piggery site.
- All water retention structures, including storm water dams, retention ponds, etc. should be constructed to have adequate freeboard to be able to contain water from 1:50 year rain events.

Conclusion:

There is enough drinking water for the pigs of this proposed piggery. Additional surface water availability is currently being investigated through the WULA process for the rest of the needed water amount to safely service this proposed piggery.

8.3 Vegetation Survey:

The following recommendations are made with regards to the proposed development:

- (i) An Environmental Control Officer must be appointed to oversee mitigation measures during construction and will be responsible for the monitoring and auditing of the contractor's compliance with the conditions of the Environmental Impact Management Plan/ Programme.
- (ii) Areas deemed of medium significance must be mitigated as far as possible by implementing the measures indicated in this report.
- (iii) Areas to be disturbed by construction activity as well as areas for ancillary activities such as stock piles, storage yards or site offices must be clearly demarcated in already disturbed areas or areas where they will cause minimal disturbance.
- (iv) The extent of the areas must be minimised and demarcated by preferably using steel droppers and nylon rope between the markers. Construction activities and materials must at all times be contained within the demarcated sites.
- (v) Alien invasive species have to be controlled before and after construction commences for the 12 recorded alien and invasive plant species recorded on site.

8.4 Stormwater Management Plan (SWMP):

Please refer to the SWMP for more detail:

This SWMP report yields a number of important implementations that need to be made on the site in order to keep pollutants from entering the surrounding natural flood routes. Pre and post development runoff calculations for the additions along the south-east part of the operations yielded the required temporary storage for the increase in runoff due to new facilities on previously undeveloped land.

Section 15 of the SWMP report focuses on the isolation of pollutants within a controlled catchment area, where the area is enclosed by means of a 3m wide and 1.7m earth berm, keeping the pollutants safely isolated from possible flash floods coming down the directly adjacent flood routes that pass through the site.

Firstly, to revert back to solving the increase in runoff due to the additions mentioned above, it would be safe to assume that by surrounding the waste treatment area with earth berms and retaining all stormwater entering this area by means of precipitation, will amply catch and retain the at least half the volume caused by the increase in runoff calculated in section 14 of the SWMP. In order to attenuate an additional volume of water to decrease the site runoff due to development, another earth berm is placed on the south-western boundary, and planted with grass swales to retard the overland flow and assist in water infiltration.

Furthermore, new ponds should be built with adequate waterproof linings as per specialist, in order to restrict ingress of pollutants into natural underground water sources. Figure 15.1, in the SWMP, shows the proposed area to be enclosed with an earth berm, this berm should disallow overland flow into the waste treatment area, and also bar any stormwater and untreated effluent from exiting this area.

8.5 Fauna:

The following recommendations were made by the specialists:

- Should hedgehogs be encountered during the construction phase of the proposed development, these should be relocated to natural grassland areas in the vicinity.
- The contractors must ensure that no fauna species are disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be

built into contracts for construction personnel, complete with penalty clauses for non-compliance.

- The proprietors must be contractually bound to implement the Environmental Management Plan (EMP) (the latter primarily dealing with manure management) and Record of Decision (ROD) during the operational phase of the development should be informed of their responsibilities in terms of the EMP and ROD.
- The owners should implement an ongoing monitoring and eradication program for all invasive and weedy plant species growing in the operational terrain (*sensu lato*).
- A comprehensive surface runoff and storm water management plan should be compiled, indicating how all surface runoff generated as a result of the development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / storm water and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions. This plan should form part of the EMP.
- The development should be restricted to the proposed footprint area of the study site and should take place in areas that has already been disturbed through past human activities.
- Copious amounts of nutrient-rich manure from the piggery into fresh water systems such as the Woodstock dam could pose an environmental risk and proper measures should be implemented to prevent these pollutants from entering the fresh water systems.
- No surface stormwater and manure generated as a result of the development may be channelled directly into the Woodstock Dam. A series of stormwater, manure settling ponds and flood retention ponds should be constructed as part of the management plan for surface runoff and storm and waste water. This management plan should be applied outside of the demarcated wetland buffer/flood zone and should not impact on the natural hydrology and morphology of the dam.
- Since special care needs to be taken to prevent surface stormwater rich in sediments and other pollutants such as nutrient-rich manure generated from the piggery from entering the dam, mechanisms are required to prevent erosion and dissipate water energy, such as drainage diversions and berms.
- Measures should be implemented to prevent soil erosion as a result of storm water down flow.

- All powerlines that form part of the infrastructure of the development should be fitted with anti-collision devices to prevent birds from colliding with the powerlines.
- No plants not indigenous to the area, or exotic plant species, especially lawn grasses and other ground-covering plants, should be introduced in the landscaping of the proposed development, as they might spread into the areas of natural vegetation and into the wetland;
- The cultivation of trees and shrubs in gardens proven to be advantageous to birds should be encouraged. The area does not support indigenous trees and shrubs; however woody garden plants are accepted as a given and exotics will result in an influx of common garden bird species.
- Entrance by vehicles, especially off-road cars and bakkies, off-road bicycles and quad bikes to the areas to be excluded should be prohibited, both during the construction phase and during the lifespan of the project.
- The areas earmarked for exclusion from development must be fenced off during the construction phase to ensure that the developer and his contractors do not damage these areas or do not cover them with soil, builders' rubble or waste.
- Prior to commencement of the construction phase the wetland system and the proposed buffer zones must be properly fenced off and machinery and staff must be banned from entering the fenced areas.
- No development should be allowed within the wetland areas and the adjacent grassland areas on site, and these areas should be left as natural as possible.
- Proper veld management practises should be implemented with respect to grazing, burning and control of woody invasions.
- Where possible, work should be restricted to one area at a time, as this will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- Where possible the construction of the proposed development should take place during the winter months during the time when most avifaunal species are not breeding.
- No vehicles should be allowed to move in or across the wet areas or drainage lines and possibly get stuck. This leaves visible scars and destroys habitat, and it is important to conserve areas where there are tall reeds or grass, or areas where there is short grass and mud.

- The contractor must ensure that no fauna is disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- It is suggested that where work is to be done close to the drainage lines, these areas be fenced off during construction, to prevent heavy machines and trucks from trampling the plants, compacting the soil and dumping in the system.
- During the construction phase, noise must be kept to a minimum to reduce the impact of the development on the fauna residing on the site.
- Alien and invasive plants must be removed.

8.6 Aquatic Ecosystems:

The following recommendations were made by the specialists:

Wetland related mitigation measures:

- Although no manure will be released into the natural environment, the handling of the manure must occur with care. Transfer of manure between transport vehicles must be done on a bunded area, with a dedicated dirty water trap;
- Piping and storage of manure must be regularly inspected (weekly) to ensure no leaks occur in the systems;
- Road infrastructure must avoid being adjacent to wetland and associated buffer areas. This is to prevent hard surfaces from the roads increasing water velocities into the wetland and creating other erosion areas;
- The use of natural vegetation barriers around buffer areas to ensure phytoremediation is increased;
- Storm water management on site must take cognisance of possible pollution arising from the site, with emphasis on hydrocarbon and manure pollution. This must also include the mitigation of speeds of storm water entering the wetland from the study site. strong attenuation must be included where possible; and
- Signage must also be included to increase awareness of the wetland found on site and the impact of customers on the wetland.

The following general mitigation measures are proposed:

- An alien vegetation eradication programme should be implemented on the site to remove the alien vegetation from the wetland areas.

- An environmental control officer (ECO), specialising in aquatic systems (AECO) must be appointed throughout the project to ensure the longevity of the impacted aquatic system.
- The use of cement lined channels must be avoided at all costs and lining must be done with Loffel stones (or Amourflex stones) or similar products. This is to prevent the loss of habitat to aquatic organisms living in the system.
- The ramps for the in- and out flows from the construction site must be lined with Reno mattresses and or gabions to prevent structure undermining and to ensure flow is dispersed and mitigated. Vertical steps should not exceed 200 mm, to ensure aquatic fauna movement and migration.
- The use of gabion structures, well keyed into the surrounding bank walls and secured to the ground is recommended.
- If any construction activity must occur within the riparian areas then it must commence from upstream proceeding downstream with proper sedimentation barriers in place to prevent sediments and pollution moving downstream from the site. This includes non-perennial systems.
- The removal and translocation of impacted hydrophytes must be done prior to construction commencing.
- Due to the perennial nature of the system, construction should preferably commence during the dry months.
- All sensitive areas together with the associated buffer zones should be fenced during the construction phase to prevent any human activity from encroaching onto these areas. Monitoring of the fences is of paramount importance to ensure no infringement of the fences occurs.
- Removal of debris and other obstructing materials from the site must take place and erosion-preventing structures must be constructed. This is done to prevent damming of water and increasing flooding danger.
- Removed soil and stockpiling of soil must occur outside the extent of the watercourse to prevent siltation and increased runoff during construction. This includes the buffer zones and 1:100 year flood lines.
- Proper toilet facilities must be located outside the sensitive areas: The impact of human waste on the system is immense. Chemical toilets must be provided which

should always be well serviced and spaced as per occupational health and safety laws, and placed outside the buffer and 1:100 year flood lines.

- Spill kits must be stored on site: In case of accidental spills of oil, petroleum products etc., good oil absorbent materials must be on hand to allow for the quick remediation of the spill. The kits should also be well marked and all personnel should be educated to deal with the spill. Vehicles must be kept in good working order and leaks must be fixed immediately on an oil absorbent mat. The use of a product such as Sunorb is advised.
- No plant machinery may be stored or left near the aquatic areas, when not in use.
- Frequent inspection of the site must be done to ensure that no harmful practices occur on site.
- A photo collection must be taken from fixed demarcated spots to detect changes in the construction area over time. These photographs must be dated and should include the entire site.
- No construction personnel are allowed to collect, harvest or kill any species of fauna and flora on the site.
- Any species of fauna encountered during the construction phase should be moved to a safe location where no harm can be bestowed on the species.
- If water is sprayed on the construction surface for any reason during the construction process, utmost care must be taken to ensure the runoff water does not pollute the system or any of the associated catchment areas. A storm water cut-off drain should be constructed between the construction area and the aquatic system to ensure that storm water flowing through the construction area cannot flow into the aquatic system. The water from the cut-off drain must be collected in a sedimentation pond before entering the aquatic system.
- Any new erosion gullies must be remediated immediately.
- Construction should commence during the dry season or when flows are at their lowest where reasonably possible.
- Regular inspection of erosion preventing devices is needed.
- Construction camps: Plant parking areas and material stockpiles must be located outside the extent of the wetland.
- Access routes should be demarcated and located properly so that no damage to the system can occur. These roads must be adhered to at all times. A large turning

place must be provided for larger trucks and machinery. No grading of temporary access roads is allowed as this will create dust and water runoff problems.

- Increased runoff due to removal of vegetation and increased soil compaction must be managed to ensure the prevention of siltation and the maximum stream bank stability.
- The velocity of storm water must be attenuated and spread. As far as possible the link between the stream and the local environment must be maintained. This is to ensure water movement into the soils and ensuring the survival of associated vegetation.
- Storm water leaving the site downstream must be clean and of the same quality as in situ before it enters the construction site (upstream). Preconstruction measures must be in place to ensure sediments are trapped.
- The overall alluvial characteristics of the drainage line (balance between sand, gravel, and stone) must be similar to before construction to ensure natural systems of flooding and sedimentation deportation and conveyance occur.

9. A TABULAR VERSION OF ENVIRONMENTAL ASPECTS, IMPACTS, MITIGATION AND PERSONS RESPONSIBLE

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT POTENTIALLY TO BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE POTENTIAL IMPACT/ISSUE	MITIGATION MEASURES AND PERSON/S RESPONSIBLE
Establishment of the pig houses, mill, site office, and other associated infrastructure (c) (o)	Topography.	Not applicable to a specific locality.	The pig houses, mill, site office and associated infrastructure will be established on a relatively flat terrain and no significant impact on the topography is anticipated.	The development should merge with the current topography as much as possible. Responsible Person: Farmer / Developer
Preparation of the site, including the clearance of vegetation (c)	The existing grass layer, shrubs and trees are to be removed for the establishment of buildings and infrastructure.	Pig houses, mill, site office, and other associated infrastructure footprint, and parking areas.	The removal of vegetation cover, such that the soil surface is exposed, may lead to increased soil erosion in certain areas. Where the removal of surface vegetation is of a temporary nature only, the establishment of weed species is a threat. The topsoil layer is required to rehabilitate the vegetation in these areas; where surface	It is advisable that only vegetation be removed where and when it is necessary. After removal of vegetation, landscaping needs to be incorporated by re-establishing natural grassland/vegetation where appropriate. No red data plant species were recorded during the site visits conducted.

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			vegetation has been temporarily removed it must be replaced again.	Responsible Person: Farmer / Developer
Excavations for the establishment of foundations (c)	Vegetation and soil layers.	Pig houses, mill, site office, and other associated infrastructure footprint, and parking areas.	The existing vegetation will be permanently removed to accommodate the pig houses, mill, site office, and other associated infrastructure footprint, and parking area foundations, which will be approximately the size of the built footprint.	It is advisable that only vegetation be removed where and when it is necessary. After removal of vegetation, landscaping needs to be incorporated by re-establishing natural grassland/vegetation where appropriate. No red data plant species were recorded during the site visits conducted. Responsible Person: Farmer / Developer
Establishment of stock pile areas (c)	Soil and vegetation cover.	Locations still to be determined; the impacts on soil and vegetation will	Stockpiles will need to be established for the storage of aggregate, bricks and cement. Stock piles cause compaction of soil	Building material stockpiles must not be stockpiles within any of the riparian areas. Any alien vegetation that established itself because of

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		occur wherever stockpiles are established.	surfaces, which promotes the establishment of unwanted weed species. The establishment of weeds greatly reduces the quality of the natural vegetation on site.	disturbance need to be eradicated. Responsible Person: Farmer / Developer/ Contractor
Generation of construction waste (c)	Soil, vegetation, aesthetic quality of the site and surface water run-off.	The site and its directly adjacent areas.	Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly. Polluted surface water run-off may pollute the water resources (both the underground resources and other drainage areas in the vicinity). Construction waste that is not removed from site will also be an eye sore in the area and will promote the growth of unwanted weed species.	Building rubble has to be collected at a centralized area and preferably in skip waste bins. No illegal dumping may be allowed in the construction phase and this will have to be checked and monitored by the appointed Environmental Control Officer. Responsible Person: Farmer / Developer/ Contractor

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Movement of construction vehicles on all local road networks (c)	Air quality due to dust generation. Traffic safety aspects. Soil and vegetation cover.	Wherever construction vehicles travel. Potential impacts may be eminent over a wide area if not carefully managed and restricted.	The movement of heavy vehicles (transporting building material) on tar roads and especially busy main roads, can impact on traffic safety, due to accidental soiling of the road surface and/or speeds driven by construction vehicles. Access points to the site are dirt; therefore, dust generation may be a problem to adjacent land owners and motorists in general. Movement will cause limited or localised disturbances and temporary soil compaction, which promotes the establishment of weed species.	Alien plant species need to be controlled and it must be ensured that weeds are removed. Dust depression measures such as watering the bare surfaces need to be implemented. Responsible Person: Farmer / Developer/ Contractor
Maintenance of construction vehicles (c)	Possible soil contamination, which in turn will affect	Location of the construction camp, if established	In the event of on-site repairs and servicing, soil surfaces, vegetation, and run-off may be locally	The construction camp has to be identified and communicated to the ECO as soon as its position is

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	surface water run-off. Vegetation.	temporarily on the development site is still to be determined.	contaminated. Soil contamination during construction vehicle maintenance is easily prevented. But in the event of such an occurrence, the impact will be of a temporary nature only, as spills can and should immediately be cleaned up. The quality of surface water may temporarily be negatively affected.	available. Any fuel depot areas have to be bunded and where fuel hoses will operate, absorbing gravel needs to be provided. This area can also be lined with a small piece of plastic below the gravel. As soon as any spillages occur, the gravel has to be collected and disposed of as hazardous waste. Responsible Person: Farmer / Developer/ Contractor
Noise generation by operating air compressors, excavators and other heavy machinery (c)	Ambient noise levels.	Areas on and surrounding site at which construction activities take place.	Noise generation caused by the operation of construction machinery causes social disturbances. These disturbances are of a temporary nature only (during the construction phase).	Noise mitigation measures are required in order to keep the noise generated by construction activities as low as possible - given the site's relatively close proximity to some residential areas. This can be

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				<p>achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example, poor maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as construction outside of these time frames will be a nuisance to adjacent dwellers.</p> <p>Responsible Person: Farmer / Developer/ Contractor</p>
Construction camp	Aesthetic impacts,	Locations of the	The establishment of construction	Proper management of any

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establishment (c)	social aspects, subsurface and groundwater quality, generation of domestic waste, vegetation removal, soil surface compaction and faunal impacts.	construction camps still to be determined - will be within the least sensitive areas.	camps will have a localised impact on the soil and vegetation cover of the site, as well as on the quality of surface water - as a result of construction camp litter, vehicle servicing, fuel storage and other such activities.	temporary toilets need to be undertaken on a strict schedule. The construction camp must be more than 100 metres away from any water bodies. Construction camps. Responsible Person: Farmer / Developer/ Contractor
Temporary fuel storage on site (c)	Possible soil and water contamination.	This will occur in the construction camp(s) established and their localities are still to be determined.	There shouldn't be any impacts as a result of this activity. However, in the event of a fuel spill the soil and water may become contaminated, which should be dealt with rapidly.	<ul style="list-style-type: none"> No temporary fuel storage tanks or containers may be erected near drainage courses and refueling must be done by means of a fuel bowser. Fuel storage areas must be banded effectively and all applicable safety standards have to be adhered to. The banded area

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				around the fuel storage areas should be able to contain 110% of the volume of the fuel container in side it. <ul style="list-style-type: none"> All fuel storage areas must be fenced and secured. <p>Responsible Person: Farmer / Developer/ Contractor</p>
Provision of water for construction on site (c)	Use of ground water resources is possible but is it anticipated that NO natural surface water sources would be used. A WULA is being conducted in this regard. WULA will	Water table within the study area.	Groundwater will be impacted upon for construction purposes. The use of water as an important resource must be assessed carefully and a statement should be made on the impact once it has been established what the source of the water for construction purposes will be. The WULA is also necessary as	Water will most likely be sourced from boreholes. Possible significance assessment on ground water resources would be of moderate significance, because it will most likely come from underground resources. Water use management set out in the WULA must be followed closely.

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	concentrate on this proposed development due to: <ul style="list-style-type: none"> • Section 21(a): taking water from a water resource; • Section 21(b): storing water; • Section 21(c): impeding or diverting the flow of water in a watercourse; • Section 21(e): engaging in a controlled activity (irrigation); • Section 21(g): disposing of waste in a 		mentioned.	Responsible Person: Farmer / Developer/ Contractor

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	manner which may detrimentally impact on a water resource; and <ul style="list-style-type: none"> Section 21(i): altering the bed, banks course or characteristics of a watercourse 			
Provision of water for consumption (by workers) on site during the working day (c)	Site quality (in terms of littering).	The site.	There is boreholes on site, therefore it is anticipated that borehole water will be provided to workers on site.	Water use management set out in the WULA must be followed closely. Responsible Person: Farmer / Developer/ Contractor

<p>Sanitation provision to workers during the working day (c)</p>	<p>Possible contamination of subsurface soil and surface water quality.</p>	<p>Still to be determined, but if provided, will be within the construction camp to be established.</p>	<p>Insufficient chemical toilets will have a health impact. Subsurface soil contamination and contamination of surface / subsurface water quality could occur if the ablution facilities provided are not according to standard. A temporary impact is possible; however, it can easily be prevented.</p>	<p>Sufficient chemical toilets should be provided for workers, in the range of 1 per every 8 workers, within walking distance of all construction activities. These toilets must be well maintained and inspected on a daily basis to ensure that they are clean and functioning properly. No washing of people and/or goods should take place on cleared surfaces, as this water should not be allowed to drain into any adjacent storm water canals or drainage lines.</p> <p>Responsible Person: Farmer / Developer/ Contractor</p>
<p>Waste disposal and handling of solid waste and sewage associated with the piggery and waste</p>	<p>The aesthetic quality of the site, social impacts (health of workers and adjacent communities within</p>	<p>The site and directly surrounding areas.</p>	<p>Poor design and layout of waste collection / storage facility sites will have a negative impact in terms of surface pollution and aesthetic quality. Practical design and</p>	<p>Therefore, practical design and efficiency is essential in this regard. The location of the refuse areas/waste collection area must be carefully planned and located so</p>

<p>disposal by consumers (o)</p>	<p>the study area), possible surface water run-off and groundwater resource contamination, as well as air pollution.</p>		<p>efficiency is essential in this regard. Untidy collection facilities and wind-blown refuse is often a problem associated with piggeries. Incorrect management of solid waste and sewage can cause air pollution (in the form of foul odours), health problems (pests and other diseases) and water pollution.</p>	<p>as not to cause a visual nuisance, as wind-blown refuse is often a problem. It is suggested that large black bins, which are secured in place, are distributed frequently at strategic locations across the site to discourage littering. The dustbins should be secured to prevent them from being knocked over or carried away. The lids should also be suspended permanently above the dustbins, to ensure that the waste disposed of is efficiently contained. The waste from these bins should be collected on a weekly basis and stored in a refuse collection yard (which should be contained within a walled fence), until such a time that a certified/registered contractor collects the waste - on a weekly basis - to be disposed of at a registered waste disposal site or</p>
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				<p>when the farmer see fit to do it himself.</p> <p>Waste management of pig manure slurry from piggery to storage tanks/damns: Refer to 5.3.2</p> <p>Responsible Person: Farmer / Developer/ Contractor</p>
Cleaning and maintenance of surfaces (o)	Surface water run-off (into the storm water system) and water quality within the study area.	Storm water systems and natural drainage areas.	Chemicals used in the routine cleaning of surfaces (and possible oil and fuel spill clean-ups) can result in polluted surface water run-off, which enters the storm water systems, thereby affecting the quality of the storm water that may eventually end up contaminating the natural drainage system.	<p>Any chemicals or effluent must always be collected in closed containers / sumps when cleaning surfaces. No chemicals or effluent must enter storm water drainage systems or natural veld.</p> <p>Responsible Person: Farmer / Developer/ Contractor</p>
Impact on prevailing ambient noise levels (o)	Adjacent landowners.	The area directly adjacent to the piggery.	Noise will be generated by the movement of vehicles associated with the piggery activities and occasional squealing of pigs.	<ul style="list-style-type: none"> Ensuring that machinery and trucks are well-oiled and maintained; this will make less noise than poorly serviced

				<p>construction equipment.</p> <ul style="list-style-type: none"> • Silencers can be fitted to exhausts of heavy vehicles to limit the noise they produce. • Lastly, construction hours should be confined to daylight hours of a normal working day, specifically from 7 am to 5 pm in the summer and 7.30 am to 5 pm in the winter. • No activities should take place on Saturdays after 14:00 and no actions must take place on Sundays. <p>Make sure to set a routine for feeding pigs so that noise from pigs is controlled at specific times.</p> <p>Responsible Person: Farmer / Developer</p>
Impact of illumination	Visual and aesthetic	Areas directly	Night illumination will be required.	Therefore, to pay special attention

<p>produced at night (o)</p>	<p>quality, social environment of adjacent community.</p>	<p>adjacent to the piggery.</p>	<p>The light produced could cause a disturbance to adjacent landowners. However, light illumination is usually not a problem associated with piggeries. Light orientation will be important in this regard.</p>	<p>to “blending” the development to the environment is not a practical exercise. In terms of the level and nature of night illumination, carefully placed and downward shining lights are recommended to reduce this impact sufficiently. No high flood-lights should be installed on the site.</p> <p>Responsible Person: Farmer / Developer</p>
<p>Impact on storm water quality during the operation of the piggery and in the event of accidental spillage (o)</p>	<p>Storm water run-off, natural drainage courses and areas in the vicinity of the study area.</p>	<p>Storm water canals and the area surrounding the site of the proposed development.</p>	<p>Should surface water run-off be contaminated it may run through the storm water systems into the natural drainage course. This will occur under circumstances where no anti-pollution measures are designed and installed. The design of the storm water system, to drain the premises, must be such that it prevents the risk of storm water</p>	<p>Maintenance of storm water outlets is required to ensure that they don’t get blocked (i.e. no longer fulfil their function) or result in erosion. The custodian of the development has to perform regular checks and maintenance.</p> <p>Responsible Person: Farmer / Developer</p>

			pollution or abnormal soil erosion at its outlets.	
Impact of the proposed development on future land use (o)	Land use options and agricultural potential of the site.	Within the study area; which is agricultural land.	The sites agricultural potential, rated as moderate arable land. Therefore, this is not a significant impact.	None. It is an agricultural practice on agricultural land.
Impact on road safety aspects and the safety of the community moving through the study area (o)	Social environment and road user safety.	Entrance and exit points of the farm.	The movement of traffic around the development will have an impact on the ambient or prevailing noise levels. Unsafe road access conditions would result in danger to road users. Therefore, all minimum applicable standards relating to access provision and the approval of plans will be adhered to.	Noise mitigation measures are required in order to keep the noise generated by construction activities as low as possible. This can be achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example, poor maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as

				<p>construction outside of these time frames will be a nuisance to adjacent dwellers. On operational phase the general business day noise will be the same as for the surrounding properties.</p> <p>Responsible Person: Farmer / Developer</p>
<p>General building maintenance (o)</p>	<p>Visual and aesthetic quality.</p>	<p>The study area at large.</p>	<p>The design and nature of buildings and their general finishing will determine the impact of the proposed development on the visual quality of the study area. Poor maintenance of the facility as a whole will negatively affect the aesthetic quality of the surroundings. The site is situated within a rural area; therefore the significance of this impact is anticipated to be low.</p>	<p>None. It is an agricultural practice on agricultural land.</p> <p>Responsible Person: Farmer / Developer</p>

10. COMPLYING, REMEDYING, AND CONTROLLING ENVIRONMENTAL POLLUTION INCIDENTS AND CAUSES

If there is an environmental incident, like oil or diesel spills, or any other form of pollution during the construction phase then the applicant/contractor/engineer should consult with the appointed Environmental Control Officer (ECO) for the project. The ECO should then respond immediately on the incident at hand with the appropriate mitigation measure as practically as possible.

An environmental awareness plan should be communicated to the workers and contractors via a training session before the construction phase starts. All risks should be put forward in terms of pollution and environmental degradation. The environmental awareness plan can be compiled by the ECO or environmental practitioner for the training session before the construction phase.

APPENDIX 2

APPLICATION FORM SUBMITTED TO KZN EDTEA



SERVICES (PTY) LTD

T/A ROCK ENVIRONMENTAL CONSULTING

PO Box 40541
Moreleta Park, 0040
601 Rubenstein Drive
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**PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM
NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM
STEYNSBURG 7803-GS, KWAZULU-NATAL.**

APPLICATION FORM for Environmental Authorisation

Prepared for: KWAZULU-NATAL DEPARTMENT OF ECONOMIC
DEVELOPMENT, TOURISM & ENVIRONMENTAL AFFAIRS
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On behalf of: STEYNSBURG PORK AND ABATTOIR (PTY) LTD.
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Environmental Management

Application for Environmental Authorization



edtea

Department :
Economic Development, Tourism and
Environmental Affairs
PROVINCE OF KWAZULU-NATAL

File Reference Number:	(For official use only)
NEAS Reference Number:	DC/
Date Received:	KZN/EIA/

APPLICATION FOR ENVIRONMENTAL AUTHORIZATION

Submitted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and regulation 6 (1) and 16 (1) of the Environmental Impact Assessment (EIA) Regulations, 2014 (Government Notice No. R 982, 04 December 2014).

PROJECT TITLE

PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS, KWAZULU-NATAL.

DISTRICT MUNICIPALITY

Uthukela District Municipality

Application for Environmental Authorization

IMPORTANT INFORMATION

PLEASE NOTE:

1. It is the responsibility of the applicant to confirm that the Department is the competent authority to which this application must be submitted (refer to NEMA section 24C).
2. The application must be typed within the spaces provided in the form. The size of the space provided is not necessarily indicative of the amount of information required.
3. Where required, place a cross in the box you select.
4. Incomplete applications will be returned to the applicant for revision.
5. The use of the phrase "not applicable" in the form must be done with circumspection. Should it be done in respect of material information required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the Regulations.

FEES APPLICABLE FOR APPLICATIONS FOR ENVIRONMENTAL AUTHORIZATIONS

6. The following fees for the consideration and processing of applications for an environmental authorization will be applicable from **01 April 2014** (refer to the Annexure in Government Notice No.141 dated 28 February 2014):

Application	Fee
Application for an environmental authorization subject to a Basic Assessment in terms of the EIA Regulations	R2 000.00
Application for an environmental authorization subject to a Scoping and Environmental Impact Report in terms of the EIA Regulations	R10 000.00

7. Where an applicant is required to pay fees for an application for environmental authorization as contemplated in section 6, this must be made by means of a bank deposit or electronic fund transfer into the bank account of this Department (refer to section 8).
8. **Payment reference number for applications for environmental authorizations and banking details for the Department:**

Reference number (only reference number to be used for environmental authorization applications):	04003903
Account name:	KwaZulu-Natal Provincial Government -Economics
Bank name:	ABSA
Branch code:	630495
Account number:	4072482787

9. Proof of payment of fees (if applicable) for an environmental authorization application must be attached as **Appendix 10** to this application form and submitted with it. Proof of payment is either a stamped deposit slip or an electronic fund transfer payment advice.

INSTANCES WHERE FEES FOR APPLICATIONS FOR ENVIRONMENTAL AUTHORIZATIONS ARE NOT APPLICABLE

10. Where an application is for a community based project funded by a government grant or the application is made by an organ of state, the fees for considering and processing applications for an environmental authorization do not apply (refer to regulation 2 in Government Notice No.141 dated 28 February 2014).

Application for Environmental Authorization

11. Where an applicant is not required to pay a fee as contemplated in section 6 of this form, a **written motivation** (with proof of funding if a government grant is applicable) must be attached as **Appendix 11** to this application form and submitted with it.
12. If you have any queries regarding the EIA process or fees applicable for applications for environmental authorizations please contact the relevant District Office of this Department. These contact details are obtainable from Regional Offices (see below).

REGIONAL OFFICE DETAILS

13. The original application must hand delivered or posted to the appropriate Regional Offices of this Department as provided below. **No faxed or e-mailed applications will be accepted** Regional Office details are:

- **FOR APPLICATIONS IN NORTHERN KWAZULU-NATAL** (Amajuba, Umkhanyakude, Uthungulu, Umzinyathi and Zululand District Municipalities)

Environment: North Region
KwaZulu Natal Department of Economic Development, Tourism & Environmental Affairs
Private Bag X1048, RICHARDS BAY, 3900

5th Floor ABSA Building, Lakeview Terrace, RICHARDS BAY

Contact Person: Ms Jacqueline Ndlovu
Cellular Telephone No: 076 806 2641/ 084 919 8939

Alternative Contact Person: Mr Muzi Mdamba
Cellular Telephone No: 082 822 2582

- **FOR APPLICATIONS IN SOUTHERN KWAZULU-NATAL** (Ethekwini Metro, Ilembe, Harry Gwala, Ugu, Umgungundlovu and Uthukela District Municipalities):

Environment: South Region
KwaZulu-Natal Department of Economic Development, Tourism & Environmental Affairs
Private Bag X9152, PIETERMARITZBURG, 3201

270 Jabu Ndlovu Street, PIETERMARITZBURG, 3201

Contact Person: Ms Mavis Padayachee
Telephone No.: (033) 264 2572

14. Unless protected by law, all information filled in on this application will become public information on receipt by this Department. Any interested and affected party must be provided with the information contained in this application on request, during any stage of the application process.
15. Please note an exemption application must be finalized before lodging an application for environmental authorization with the Department.
16. If an Environmental Assessment Practitioner (EAP) has not been appointed at the time of the submission of this application form, the declaration from the EAP must be included in the Basic Assessment Report.
17. Pages 2 and 3 may be deleted from the application form submitted to the Department.

Application for Environmental Authorization

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LIST OF APPENDICES

		SUBMITTED	
Appendix 1	Written consent from the land owner or the person in control of the land (Regulation 39(1) (If the applicant is not the land owner and Regulation 39(2) does not apply).		N/A
Appendix 2	Listing Notice 3 Map with details of activities triggered (as confirmed by the Department) (if applicable)		N/A
Appendix 3	Approval by the Department that a combined application in terms of Regulation 11 of the EIA Regulations, 2014 may be submitted (if applicable)		N/A
Appendix 4	A locality map and a plan (Regulation 16 (1) (vii))	YES	
Appendix 5	Proof of payment of environmental authorization fees (if applicable). Proof of payment includes a stamped deposit slip or an electronic fund transfer payment advice.	YES	
Appendix 6	A written motivation explaining why the payment of environmental authorization fees are not applicable (an application for a community based project funded by a government grant or an application by an organ of state).		N/A

Application for Environmental Authorization

1. PROJECT DESCRIPTION

Please provide a **detailed** description of the project.

As per applicant:

All designs are based on the latest SARPO and the European Union's new pig regulations and legislation. We have exceeded these requirements due to our personal objectives of animal welfare and to the environmental responsibilities.

All the buildings and equipment are designed with the above objectives in mind. The pigs will be free at all times except during lactations. This is to prevent the sows from injuring the piglets when they are just born. Once these piglets are strong enough to fend for themselves the farrowing crates will be opened to give the sow more space. The pigs welfare is placed at all time as priority number one.

Each production centre has a special care centre for sick or injured animals. The hygiene in the units is paramount and will be administered to prevent any disease spread. All humans will be required to shower and be disinfected when entering and leaving the units.

The effluent from the units is all organic and will be sold as organic fertiliser and organic liquid. The effluent will be stored under the houses in slurry pits and flushed every 14 days to prevent any ammoniac developing. No water will be required to flush the organic effluent from the buildings. The effluent will be piped to an effluent separation sections to prevent any contact with soil, or the nearby surroundings. The organic solids will be separated from the liquid by means of a separation press. The dry matter will be stored for selling to the surrounding farms and the organic liquid will be stored in a lined dam for fertigation through the nearby centre pivots. The above organic fertiliser will be used on 1200 ha of maize and soya fields

Water will be harvested from all the 65 000 sq/m roofs for use in the piggery. This will amount to \pm 50 000 m³ a year, which is about 40% of the requirement of the farm.

The farm will also make use of solar energy for the heating of all the water for washing purposes. We have also made provision for a biogas plant in the future when it became viable

The production units are as follow:

Site 1	Breeding and Farrowing
Site 2	Weaner and finishers
Site 3	Finishers

The unit is designed considering the following norms:

Sows:

4800 sows	28 weaned piglets per sow a year.	
114 days pregnant	28 days in lactation	150 day sow cycle = 2.4 farrowing are per year
Replacing 45/50% sows a year	AI with some natural services.	

Gilt Development:

Breeding stock will be selected at 28 days from the farrowing house and housed in the gilt development nursery. Breeding will take place every 2 weeks with 14/15 sows to supply 100 gilt weaners. This selected stock will be kept in 2 sections for 42 days and then moved to the development section. Breeding stock will be kept in groups of 18 up to 180 days or first heat. These gilts can be served by a V-Boar, or and moved to a gilt pen for 1 to 2 weeks before introduced to the ESF training section for 5/6 weeks. Two week before Insemination 50 gilts will be moved to the AI section to get used to AI crate. Provision is made for 116 gilt crates. By introducing the gilts earlier to the AI crates will improve the conception rate. The gilts will only be kept in crates for insemination. The rest of the time the sow will be free to walk around

Application for Environmental Authorization

The Gilt training section is a part of the breeding house. This section will hold 50/60 gilts in different stages from 180 days to 220 days. Gilts will be kept in pens on arrival from the development section and then moved to a training section to be introduced to the ESF stations. Gilts will be exposed to a boar. The gilts will be in contact with the detection boar. As they come on heat the gilts will be marked with a colour so that you can identify them. This will assist your stockman as gilts are sometimes difficult to recognise when they come on heat the first time.

This system will then daily select all gilts that are on heat. From here they will be moved to the AI section to be served and introduced into the sow herd. We have made provision for the gilts to be moved to the AI section two week before insemination

Breeding/ AI:

Gilts will be kept in special Gilt AI crates and the sows in sow AI crates. Boar gates are fitted in front of every 7 sows.

Sows will stay in AI section for 7 days and then moved to the early gestation for 35/40 days. In this section the sows can be kept in crates or as free sows by opening the gates.

After 35/40 days, and the sows are certified pregnant, they will move to the gestation house. The sows will be accommodated in an open house with the ESF station with 2.3 m² space each. Each sow will be individually fed by the ESF station. The sows can eat at their own time when they are in need of feed. This is an advantage as the sow is protected during feeding and the feed can be altered for the individual sow.

Farrowing:

The sows will be in the farrowing house for 26/28 days. The farrowing house will house 60 sows in 20 rooms on slats with anti-Crushing crates. These crates prevent the sows from crushing the piglets. In the design of the Plantkor sow stall, special attention was given to animal comfort with an optimum sanitation. This reduces the mortality to less than 6% below the norm.

Weaners:

- Weaning on 28 days 7/8 kg;
- 49 days in weaning house with a daily average to reaching +/- 30 kg;
- 3 to 4 % mortality;
- Required temperature is 27 degrees for the first two weeks and reducing by 1 degree per week.

There are 8 rooms with 2800 pig spaces. Each room is divided in 72 pens of which 2 are divided to be used as special care pens. The Ventilation is our unique system that allows us to ventilate up to 70 cub meters of air per weaner in one hour without causing a draught. This is essential in South Africa's hot summer months.

Finishing Pigs

We have made provision for 1400 pigs per building up to a max of 100 kg live weight. There are 26 buildings with 80 pens of 17 pigs per pen. One pen is divided into two special care pens per building. We have allowed 0.882 m² per pig.

We have made provision for 1 feed line. One silo will be used for the different feeds.

Application for Environmental Authorization

(a) Strategic Infrastructure Projects

Does the project form part of any of the Strategic Infrastructure Projects (SIPs) as described in the National Development Plan, 2011?		NO
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2. BACKGROUND INFORMATION

Project applicant:

Trading name (if any):	Steynsburg Pork and Abattoir (Pty) Ltd.		
Contact person:	Mr Michael Tetzlaff		
Physical address:	72A Oxford Rd, Johannesburg, 2193, South Africa		
Postal address:	PO Box 3060, Randburg		
Postal code:	2193	Cell:	082 325 5242
Telephone:	011 646 0290	Fax:	-
E-mail:	mt@teli.dk		

Owner or person in control of the land: (if the applicant is not the owner or the person in control of the land or Regulation 39(2) in the EIA Regulations 2014 does not apply)

Contact person:	Mr Michael Tetzlaff		
Postal address:	PO Box 3060, Randburg		
Postal code:	2193	Cell:	082 325 5242
Telephone:	011 646 0290	Fax:	-
E-mail:	mt@teli.dk		

Application for Environmental Authorization

District Municipality: Uthukela District Municipality

Local Municipality: Okhahlamba Local Municipality

In instances where the project includes more than one local or district municipality, please provide a list.

Contact person at Local Municipality: N. Malinga

Postal address: PO Box 71, Bergville

Postal code: 3350 Cell: 082 040 7570

Telephone: 036 448 8000 Fax: 036 448 1986

E-mail: Nkosi.malinga@okhahlamba.gov.za

In instances where there is more than one local authority involved, please include details of local authorities with their contact details in an Appendix.

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Property description/physical address: ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list in an Appendix to the application.

--	--

Nearest town/s: Bergville

Directions to the physical address: From Bergville BP filling station, in a westerly direction, on the R74, the turnoff to the farm is about 24.5 km on your left hand side.

Current land-use zoning: Agriculture

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings in the Appendix and also indicate which portions are relevant to this application.

Is a change of land-use or a consent use application required?	NO
Must a building plan be submitted to the local authority?	NO

Application for Environmental Authorization

Locality map:

An A3 locality map must be attached to the back of this document, as Appendix 9. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

- an accurate indication of the project site position in relation to known landmarks such as towns/villages, as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees, minutes and seconds.

Site identification and linkage

Please indicate all the Surveyor-General 21 digit site (erf/farm/portion) reference numbers for all sites (including portions of sites) that are part of the application.

N	0	G	S	0	0	0	0	0	0	0	0	7	8	0	3	0	0	0	0

(if there are more than 6, please expand the list with the rest of the numbers)
 (These numbers will be used to link various different applications, authorizations, permits etc. that may be connected to a specific site)

Please provide the **geographical coordinates** for the site

Latitude /Longitude	Degrees	Minutes	Seconds
South	28	38	09.55
East	29	08	33.22

Application for Environmental Authorization

3. ACTIVITIES APPLIED FOR

- a. For an application for authorization that involves more than one listed or specified activity that, together, make up one development proposal, all the listed activities pertaining to this application must be indicated.

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity as per the project description (and not as per wording of the relevant Government Notice) ¹ :
R. 983, 4 December 2014	4	The piggery will be built to accommodate a 4800 sow unit for commercial production. This facility will automatically therefore exceed the 8m ² per small stock unit.
R. 983, 4 December 2014	27	The clearance of indigenous vegetation, in this case grassland, will also be more than 1 ha to accommodate the infrastructure for this piggery, e.g. Pig houses, Feedmill and Manure processing plant. The footprint of these structures will be less the 20 ha.

Please note that any authorization that may result from this application will only cover activities specifically applied for.

4. STATE DEPARTMENTS IDENTIFIED IN TERMS OF S240

Please indicate to which State departments reports related to your application will be forwarded to provide comments in terms of section 24 0 (2) of NEMA:

Please note: details of the relevant contact person and the address of the State department must be provided. Add the names and other details for State departments not listed.

YES	NO	Name of Department	Contact person	Address
	X	Ezemvelo KZN Wildlife		
X		Amafa	Bernadet Pawandiwa	P.O. Box 2685 Pietermaritzburg 3201
X		Department of Water Affairs	Colleen Moonsamy	P.O. Box 1018 Durban 40000
	X	Department of Agriculture, Forestry and Fisheries		
	X	Department of Cooperative Governance and Traditional Affairs		
	X	Department of Transport		
	X	Department of Human Settlements		
	X	Department of Health		

¹ Please note that this description should not be a repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description, i.e. describe the components of the desired development

Application for Environmental Authorization

Please note that: The EAP must request comments from all relevant State departments and remind such departments that failure to submit comments with 30 days will, in terms of sub-regulation 3(4) of the EIA Regulations, 2014 be regarded as no comments..

5. ECONOMIC AND SOCIAL INFORMATION

Provide details on the anticipated socio-economic values associated with the proposed project

Anticipated CAPEX value of the project on completion	300 million
What is the expected annual turnover to be generated by or as a result of the project?	350 million
New skilled employment opportunities created in the construction phase of the project	50
New skilled employment opportunities created in the operational phase of the project	70
New un-skilled employment opportunities created in the construction phase of the project	50
New un-skilled employment opportunities created in the operational phase of the project	90
What is the expected value of the employment opportunities during the operational and construction phase?	150+ people

6. TYPE OF APPLICATION

(a) Application for Basic Assessment

This is an application that is subject to a basic assessment (EIA Regulations 2014: Chapter 4, Part 2)) and Regulation 19 in the EIA Regulations 2014 will be complied with.

YES	
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(b) Application for Scoping and Environmental Impact Assessment (EIA

This is an application that is subject to Scoping and EIA (EIA Regulations 2014: Chapter 4: Part 3) and Regulation 21 in the EIA Regulations 2014 will be complied with.

	NO
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Application for Environmental Authorization

7. DECLARATIONS

(a) Declaration by the applicant

I, MICHAEL TETZLAFF, declare that I-

- am, or represent², the applicant in this application;
- have appointed an environmental assessment practitioner to act as the independent environmental assessment practitioner for this application;
- will provide the environmental assessment practitioner and the KZN Department of Economic Development, Tourism & Environmental Affairs with access to all information at my disposal that is relevant to this application;
- will be responsible for the costs incurred in complying with the Environmental Impact Assessment Regulations, 2014, including but not limited to –
 - costs incurred in connection with the appointment of the environmental assessment practitioner;
 - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
 - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
 - costs in respect of specialist reviews, if the competent authority decides to recover costs; and
 - the provision of security to ensure compliance with conditions attached to an environmental authorization, should it be required by the KZN Department of Economic Development, Tourism & Environmental Affairs;
- will ensure that the environmental assessment practitioner is competent to comply with the requirements of the EIA Regulations, 2014 and will take reasonable steps to verify whether the EAP complies with the Regulations;
- will inform all registered interested and affected parties of any suspension of the application, as well as of any decisions taken by the KZN Department of Economic Development, Tourism & Environmental Affairs in this regard;
- am responsible for complying with the conditions of any environmental authorization issued by the KZN Department of Economic Development, Tourism & Environmental Affairs;
- hereby indemnify the Government of the Republic of South Africa, the KZN Department of Economic Development, Tourism & Environmental Affairs and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant or environmental assessment practitioner is responsible for in terms of the EIA Regulations, 2014;
- will not hold the KZN Department of Economic Development, Tourism & Environmental Affairs responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorization or prior to an appeal being decided in terms of the EIA Regulations, 2014;
- I will perform all other obligations as expected from an applicant in terms of the EIA Regulations, 2014;
- all the particulars furnished by me in this form are true and correct; and

I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B-(1) of the National Environmental Management Act, 1998 (Act 107 of 1998)



Signature of the applicant³/ Signature on behalf of the applicant

Steynsburg Park and Affairs (PTY) LTD

Trading name (if applicable)

20/2-2017

Date

² If this is signed on behalf of the applicant, proof of such authority from the applicant must be attached.

³ If the applicant is a juristic person, a signature on behalf of the applicant is required as well as proof of such authority.

Application for Environmental Authorization

(b) Declaration by the environmental assessment practitioner.

Environmental assessment practitioner (EAP):⁴

Trading name (if any):	REC Services (Pty) Ltd. t/a Rock Environmental Consulting		
Contact person:	Rowan van Tonder / Pieter van der Merwe		
Postal address:	PO Box 40541, Moreleta Park		
Postal code:	0044	Cell:	082 412 7571
Telephone:	012 997 4742	Fax:	012 997 0415
E-mail:	rock.rowan@lantic.net		
Education Qualifications ⁵ :	B. Sc. Environmental Science B. Sc. (Hons) Physical Geography M.Sc. Botany		
Professional affiliation(s) (if any) ⁶	None.		

I, Rowan van Tonder declare that I

- am the independent environmental practitioner in this application;
- will comply with the requirements for an EAP as stipulated in Regulation 13 of the EIA Regulations, 2014;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- declare that there are no circumstances that may compromise my objectivity in performing such work;
- have expertise in conducting environmental impact assessments, including knowledge of the National Environmental Management Act, 1998 (Act 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- will comply with the National Environmental Management Act, 1998 (Act 107 of 1998), regulations and all other applicable legislation;
- 2014 undertake to disclose to the applicant and the KZN Department of Economic Development, Tourism & Environmental Affairs all material information in my possession that reasonably has or may have the potential of influencing its decision with respect to this application;
- will ensure that information containing all reports in respect of this application is distributed or made available to interested and affected parties and that their participation is facilitated in such a manner that they will be provided with a reasonable opportunity to participate and provide comments on the reports;
- will provide the competent authority with access to all information at my disposal regarding this application, whether such information is favourable to the applicant or not;
- declare that all the particulars furnished by me in this form are true and correct;
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998); and
- I will comply with all the requirements as indicated in the National Environmental Management Act, 1998 (Act 107 of 1998) and Environmental Impact Assessment Regulations, 2014.



Signature of the environmental assessment practitioner

REC Services (Pty) Ltd. t/a Rock Environmental Consulting

Trading name

20/2/2017

Date

^{5 6} Please include details of names, education qualifications and professional affiliations of the EAP and each representative of the EAP appointed to manage this application.

APPENDIX 1

**WRITTEN CONSENT FROM THE LAND OWNER OR THE PERSON IN CONTROL OF THE LAND
(REGULATION 39(1) (IF THE APPLICANT IS NOT THE LAND OWNER AND REGULATION 39(2) DOES
NOT APPLY).**

N/A

APPENDIX 2

LISTING NOTICE 3 MAP WITH DETAILS OF ACTIVITIES TRIGGERED (AS CONFIRMED BY THE DEPARTMENT) (IF APPLICABLE)

N/A

APPENDIX 3

APPROVAL BY THE DEPARTMENT THAT A COMBINED APPLICATION IN TERMS OF REGULATION 11
OF THE EIA REGULATIONS, 2014 MAY BE SUBMITTED (IF APPLICABLE)

N/A

APPENDIX 4

A LOCALITY MAP AND A PLAN (REGULATION 16 (1) (VII))



Sterkfontein Dam

Kilburn Dam

Proposed Piggery Site:
GPS Coordinates:
-28.658883° S
29.142586° E

Woodstock Dam

Spienkop Dam

Lesotho



Image © 2016 CNES / Astrium
Image © 2016 DigitalGlobe
© 2016 Google
© 2016 AfriGIS (Pty) Ltd.

Google earth



Locality Map

PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS, KWAZULU-NATAL

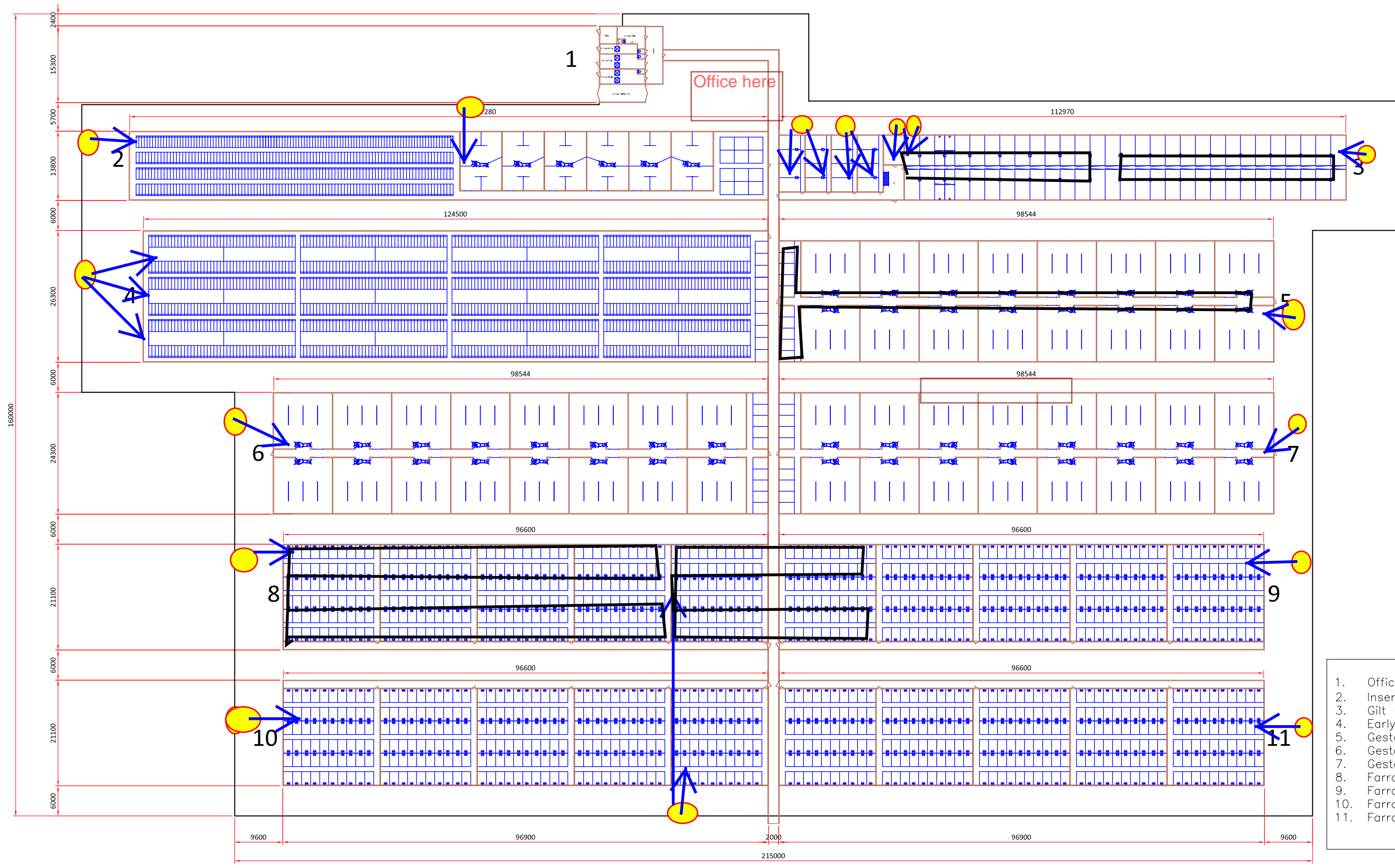
Access to Bergville piggery

Legend

- Access to Bergville piggery
- Amphitheatre Backpackers
- Bergville Manure Processing Plant
- Bergville Pig House 1
- Bergville Pig House 2
- Bergville Pig House 3
- Ethels Drive
- Feed Factory
- Saps - Ematsheni



2 km



1. Office
2. Insemination/heat-detection/Insemination
3. Gilt development
4. Early Gestation
5. Gestation 1
6. Gestation 2
7. Gestation 3
8. Farrowing 1
9. Farrowing 2
10. Farrowing 3
11. Farrowing 4

Project size: 4800 sows

Layout
Site 1

(mm) scale: 1:800
(y-m-d) date: 2016-07-04

drawing: 80a
drawn: Joost

A3

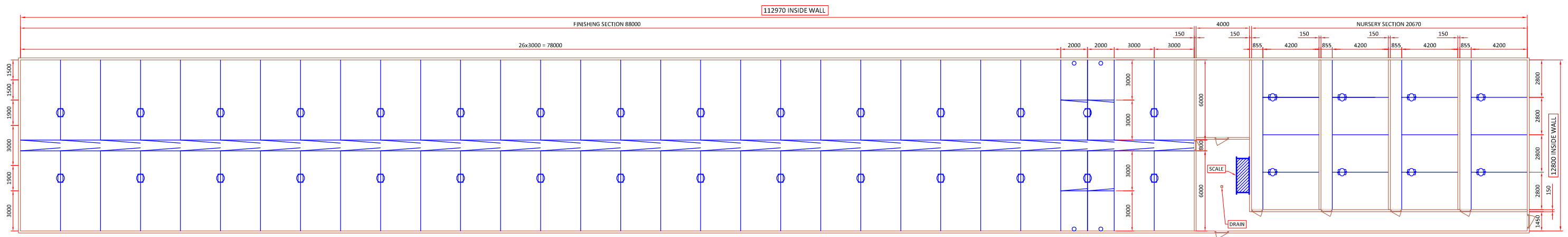
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Home 7025 Investments cc C/K 91/19469/23 Trading as

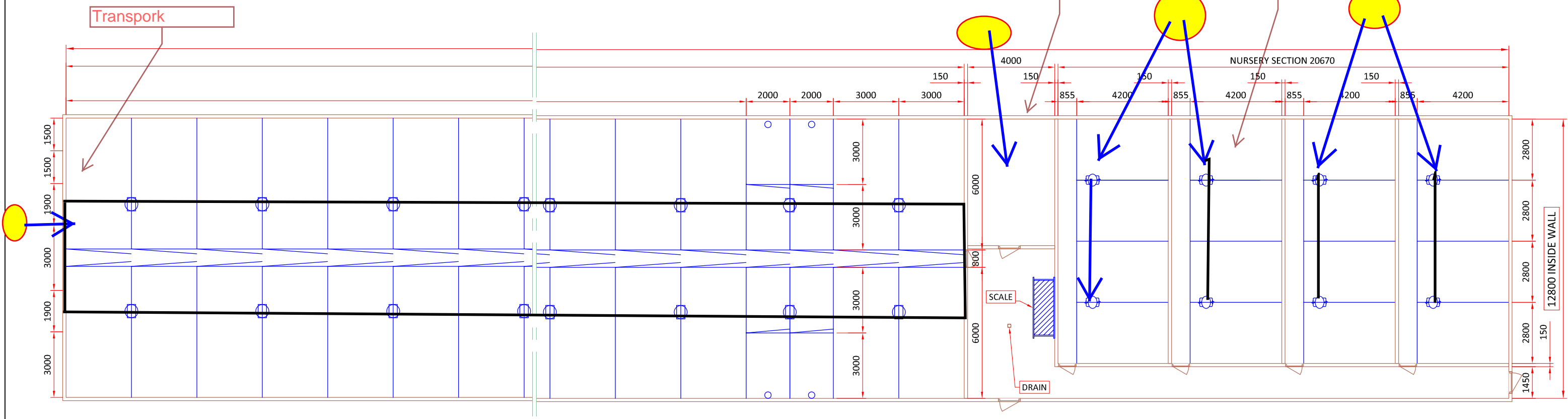
PLANTKOR

Champagne Valley
PO Box 280, Winterton 3340, South Africa
Phone: (+27) 36 468 1309/1257 Fax: (+27) 36 468 1258 E-mail: plantkor@plantkor.co.za

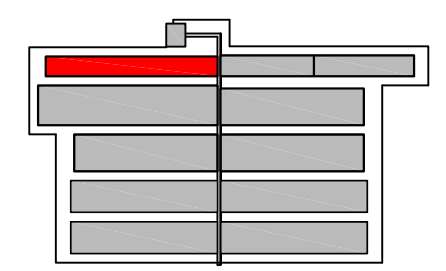
| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural



2 Layout
scale 1:300



3 Detail
scale 1:175



1 Overview Site 1
scale 1:~

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

Layout
 Gilt development

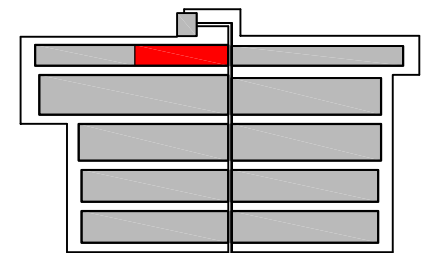
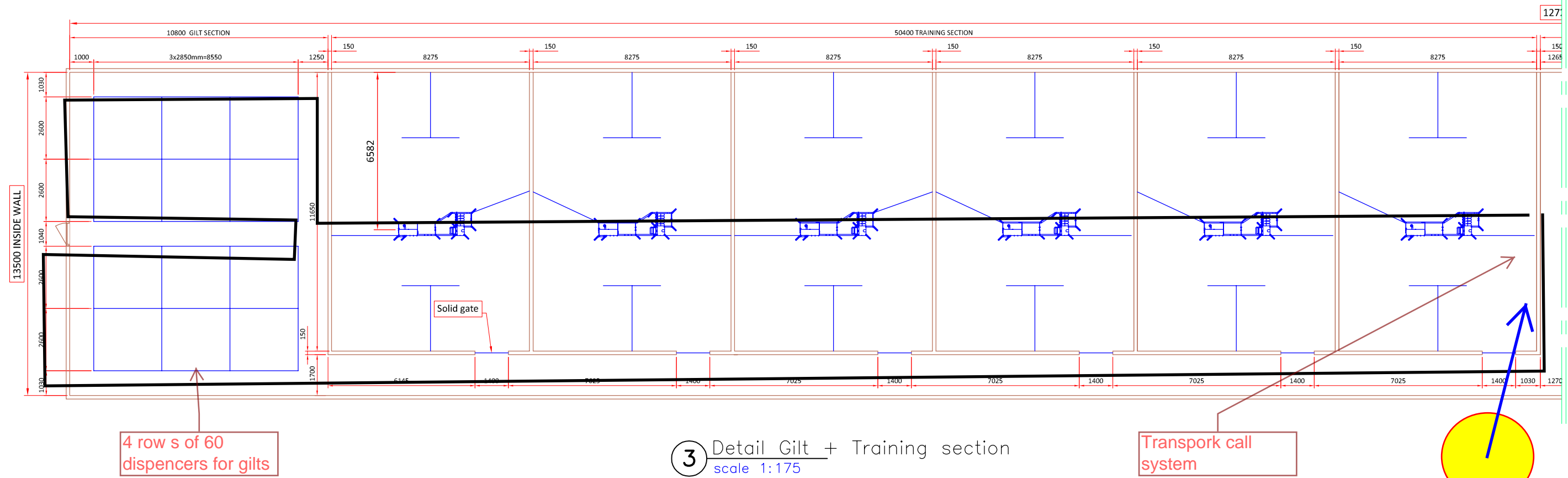
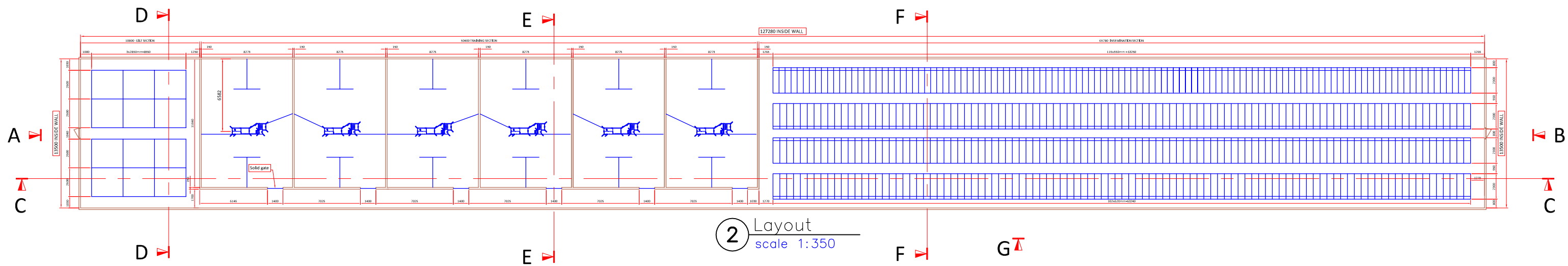
(mm) scale: 1:~
 (y-m-d) date: 2016-05-24

drawing: 10a
 drawn: Joost

A3

Home 7025 Investments cc C/K 91/19469/23 Trading as
PLANTKOR
 Champagne Valley
 PO Box 280, Winterton 3340, South Africa
 Phone: (+27) 36 468 1309/1257 Fax: (+27) 36 468 1258 E-mail: plantkor@plantkor.co.za
 | feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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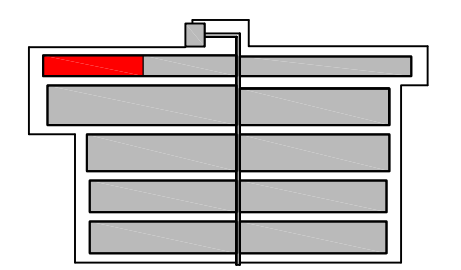
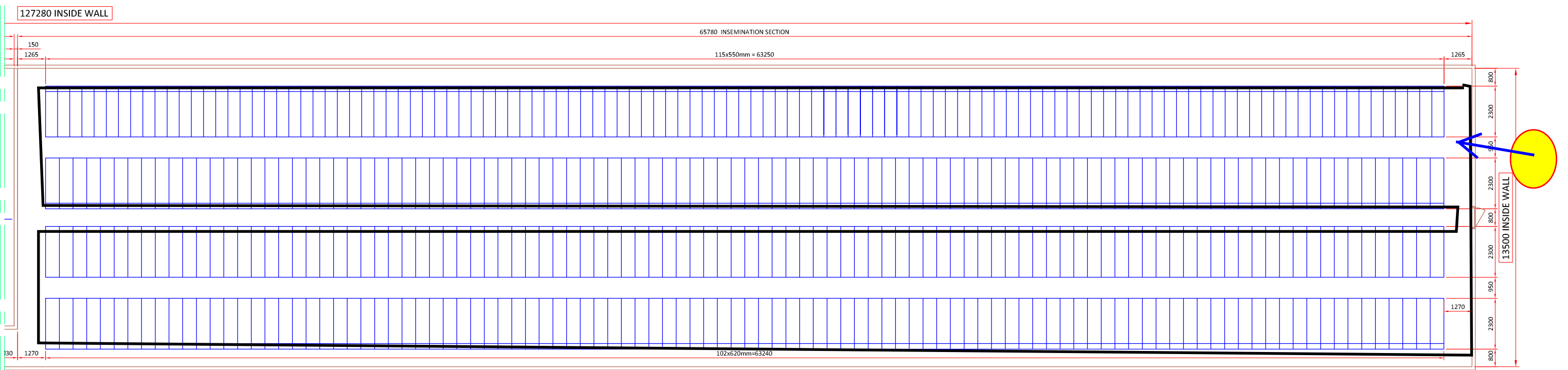
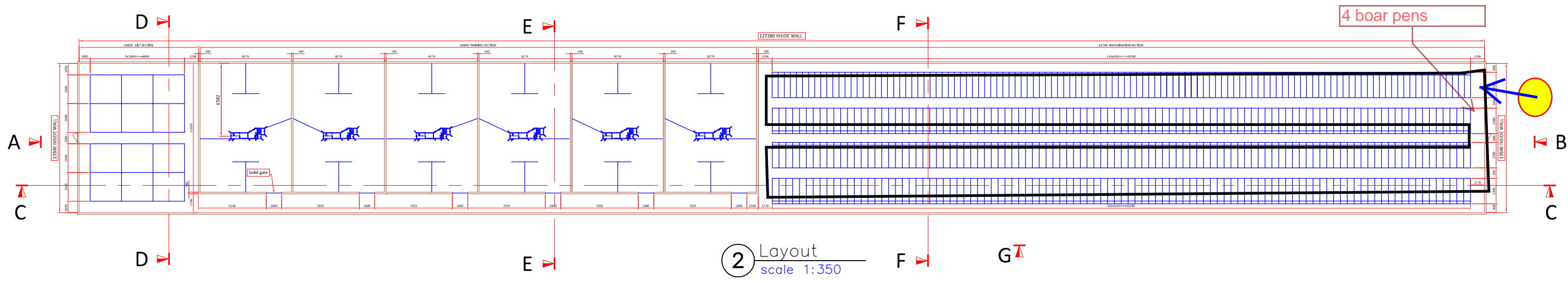
Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

Layout
 Insemination - Heat detection and training
 (mm) scale: 1:~ drawing: 20a
 (y-m-d) date: 2016-05-24 drawn: Joost

A3

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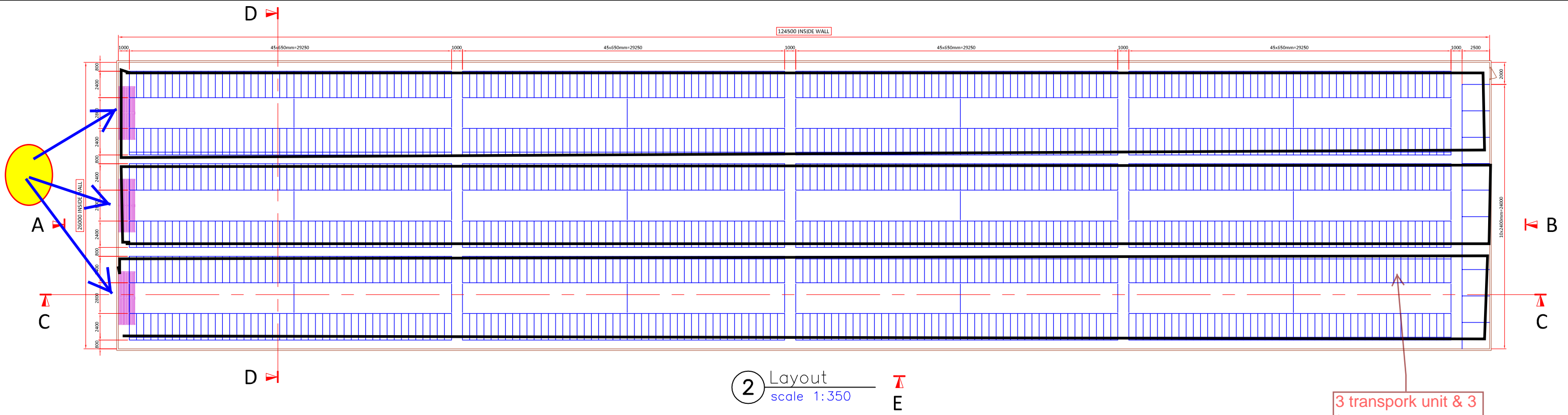
Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

Layout
 Insemination - Heat detection and training
 (mm) scale: 1:~ drawing: 20b
 (y-m-d) date: 2016-05-24 drawn: Joost

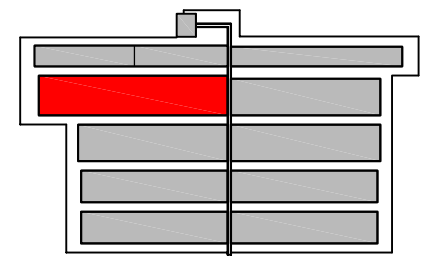
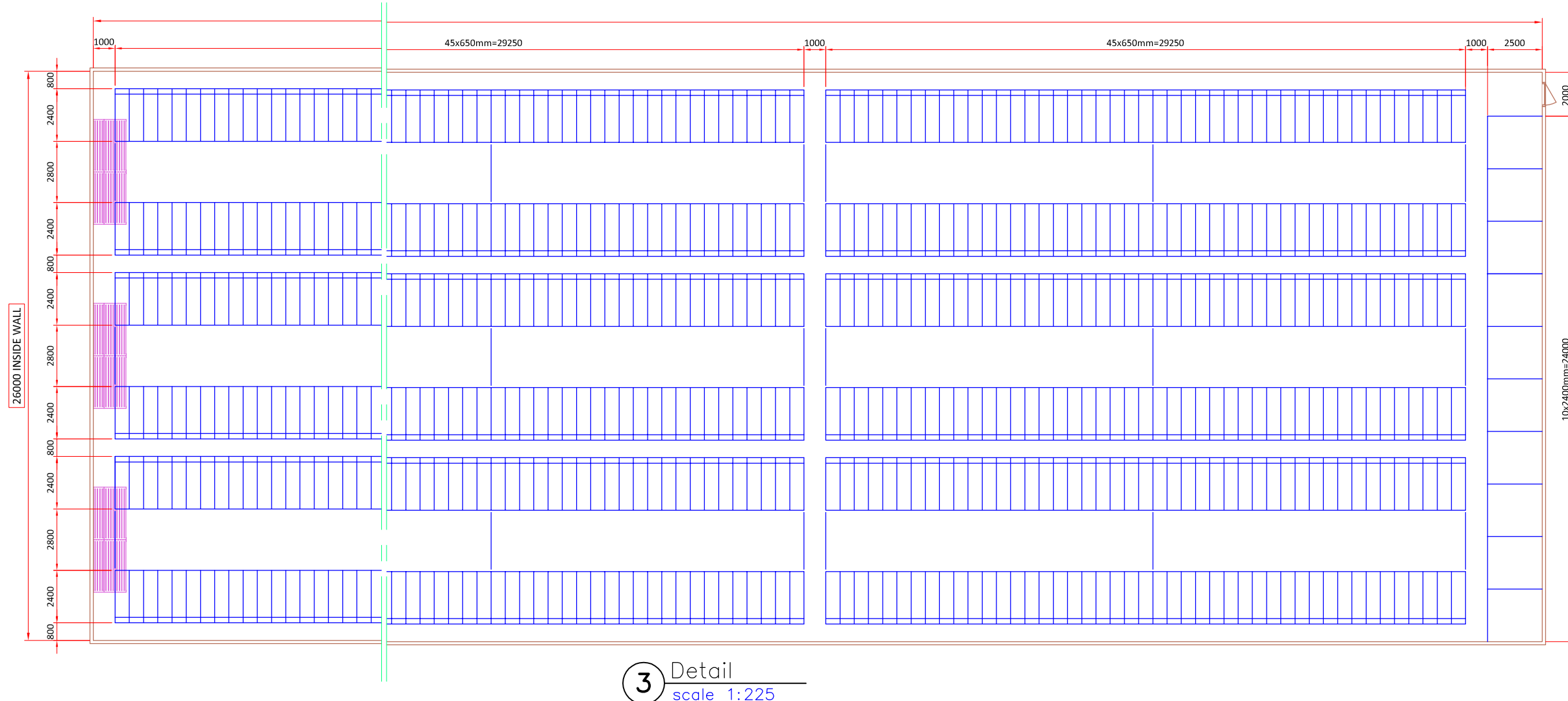
A3

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 | feed & flour mills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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3 transpork unit & 3 flex augers



Project size: 4800 sows
 1 building
 1 room with 18 rows of 60 stalls
 and 1 row of 10 group pens
 Total 1080 early gestation stalls

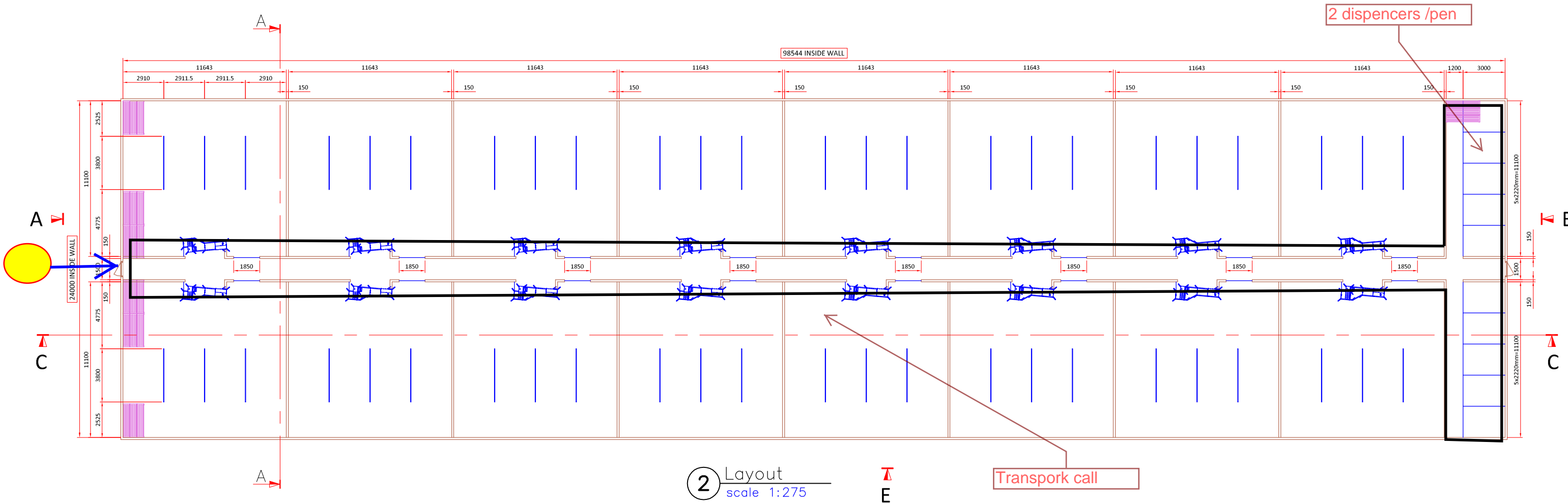
Layout
 Early Gestation

(mm) scale: 1:~ drawing: 30a
 (y-m-d) date: 2016-06-30 drawn: Joost

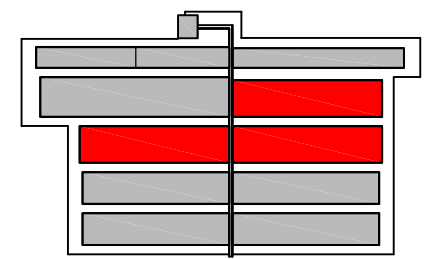
A3

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 Phone: (+27) 36 468 1309/1257 Fax: (+27) 36 468 1258 E-mail: plantkor@plantkor.co.za
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② Layout
scale 1:275



① Overview Site 1
scale 1:~

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

**Layout
Gestation**

(mm) scale: 1:~
 (y-m-d) date: 2016-07-04

drawing: 40a
 drawn: Joost

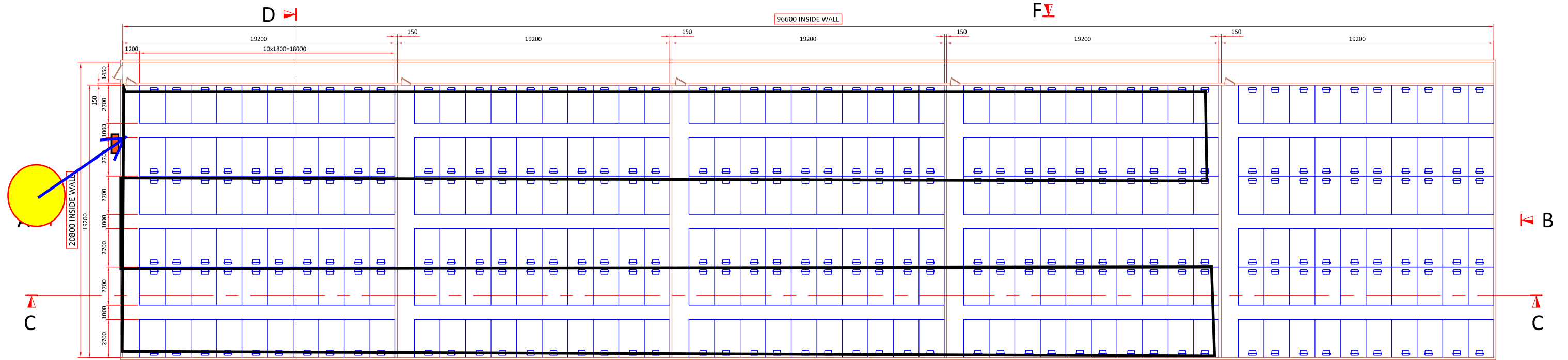
A3



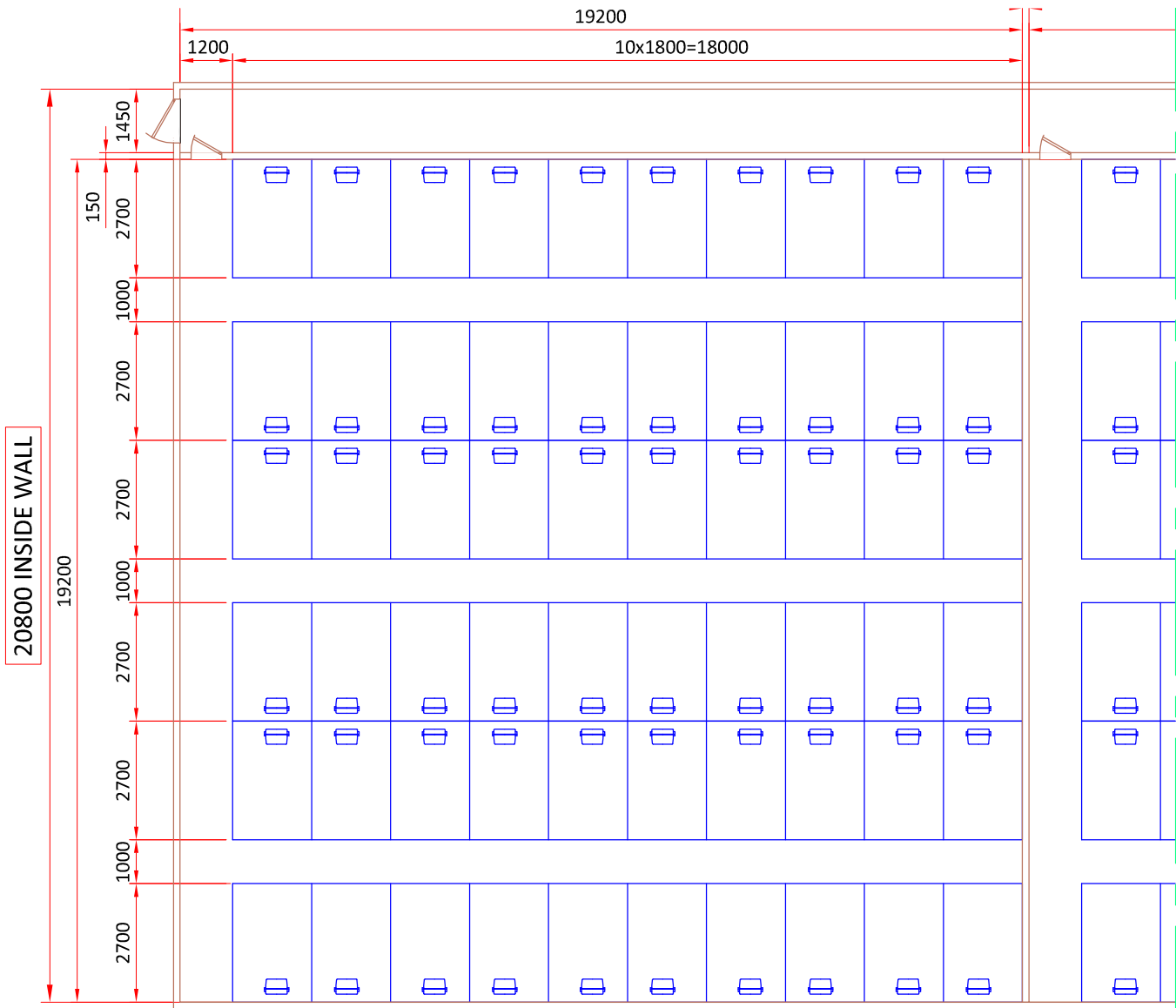
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 Phone: (+27) 36 468 1309/1257 Fax: (+27) 36 468 1258 E-mail: plantkor@plantkor.co.za

| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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2 Layout
scale 1:275



3 Detail
scale 1:150

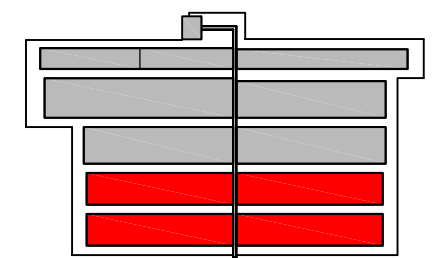
Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

Layout
Farrowing

(mm) scale: 1:~
 (y-m-d) date: 2016-05-25

drawing: 50a
 drawn: Joost

A3



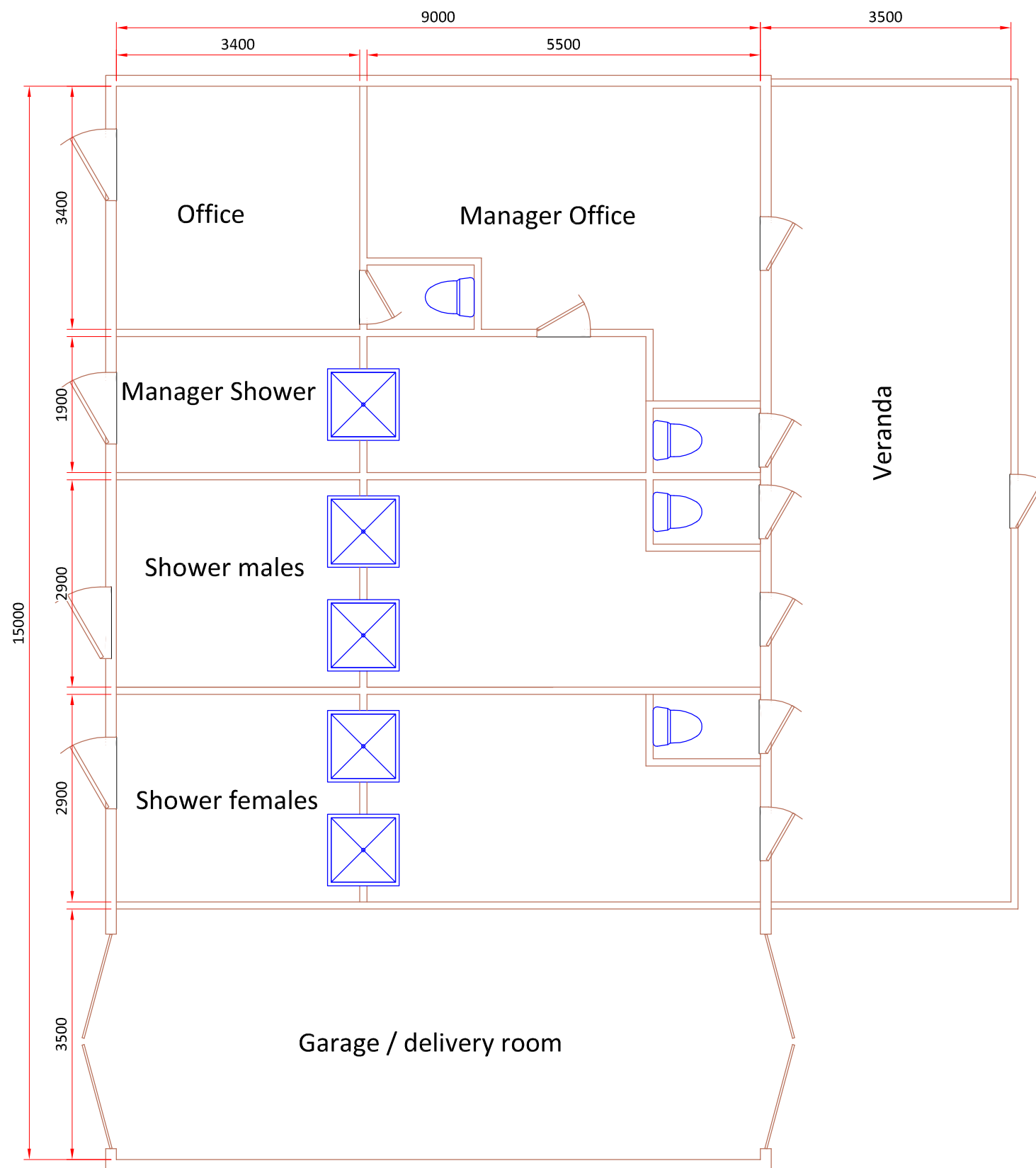
1 Overview Site 1
scale 1:~



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| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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client: 4800 sow farm

Layout

Site Office

(mm) scale: 1:75

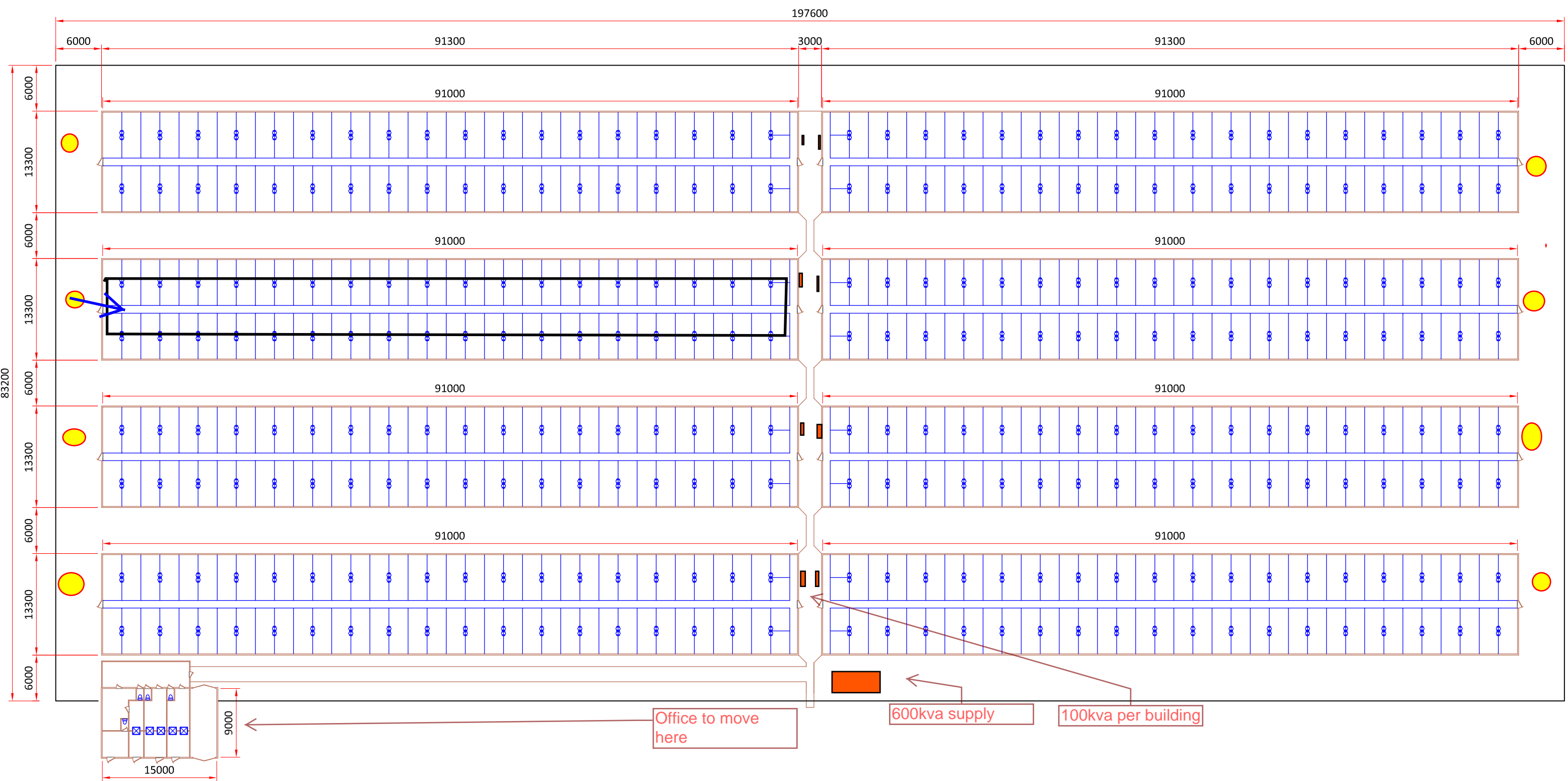
drawing: 80d

(y-m-d) date: 2016-07-04

drawn: Joost

A3

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client: 4800 sow farm
 8 buildings with per building:
 2 rows of 35 nursery pens 2500x6000mm and 2
 special care pens of 2500x3000mm
 Total 560 Nursery pens and 32 special care pens

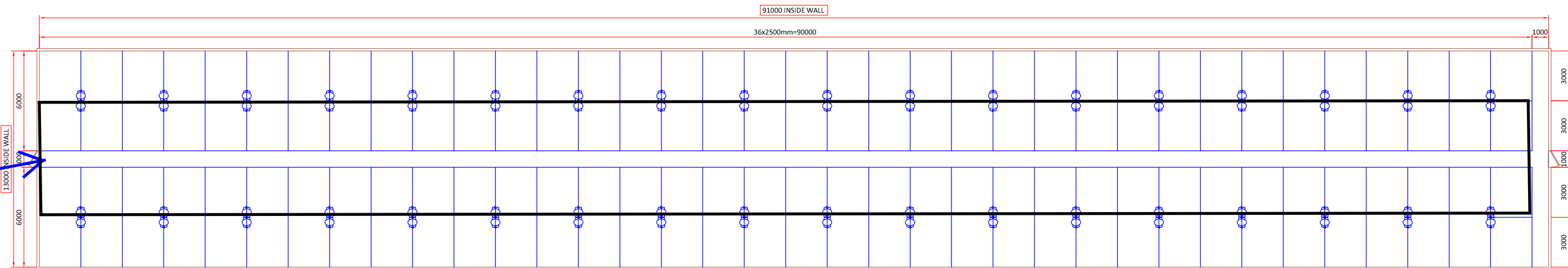
Layout
Site 2

(mm) scale: 1:500 drawing: 80b
 (y-m-d) date: 2016-07-04 drawn: Joost

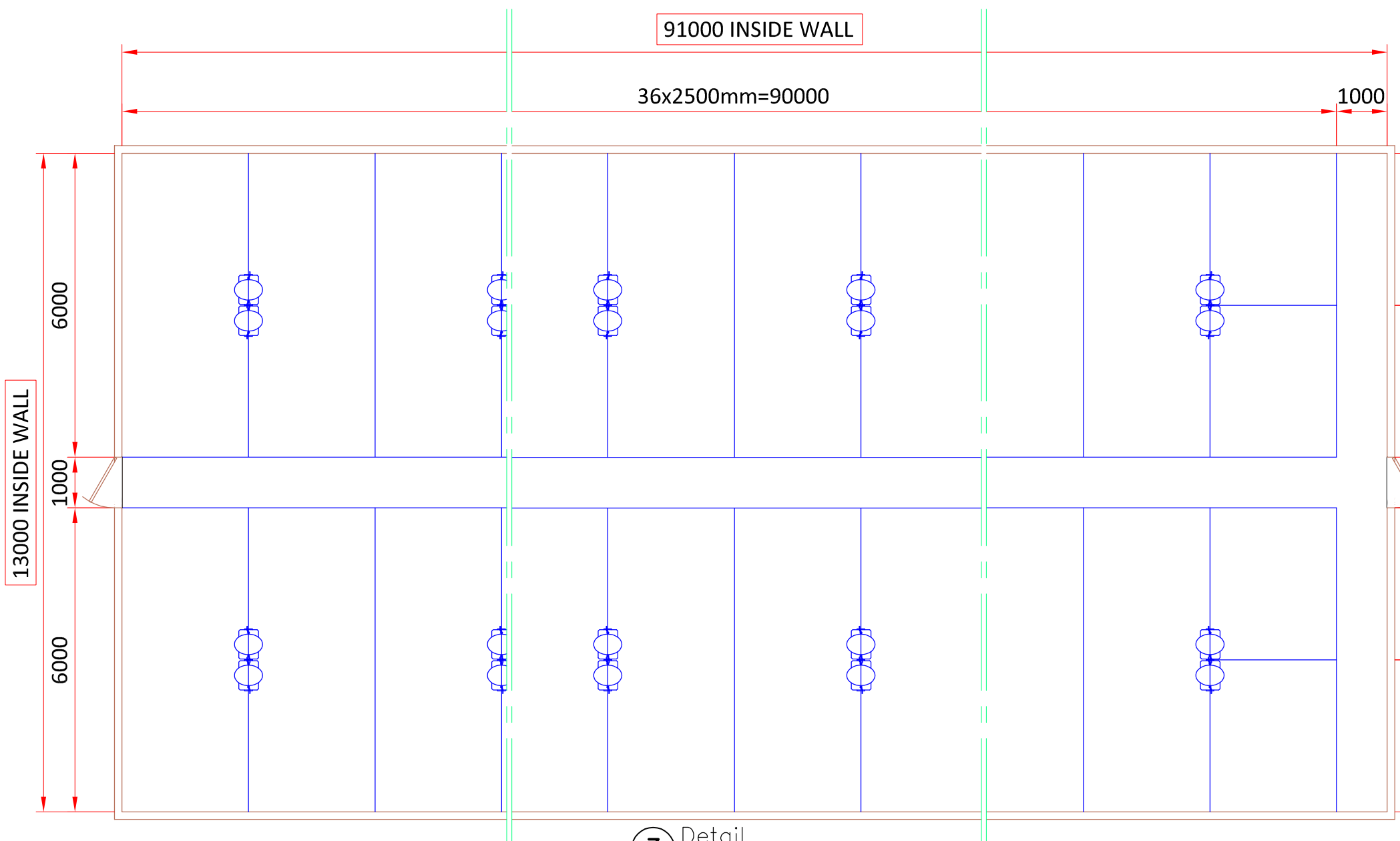
A3

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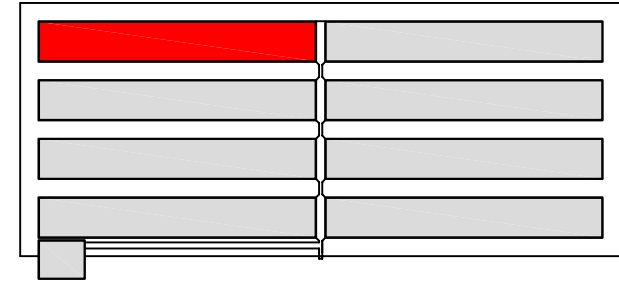
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 | feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural



2 Layout
scale 1:250



3 Detail
scale 1:100



1 Site 2
scale 1:~

client: 4800 sow farm
8 buildings with per building:
2 rows of 35 nursery pens 2500x6000mm and 2
special care pens of 2500x3000mm
Total 560 Nursery pens and 32 special care pens

**Layout
Nursery**

(mm) scale: 1:~ drawing: 60a
(y-m-d) date: 2016-02-12 drawn: Joost

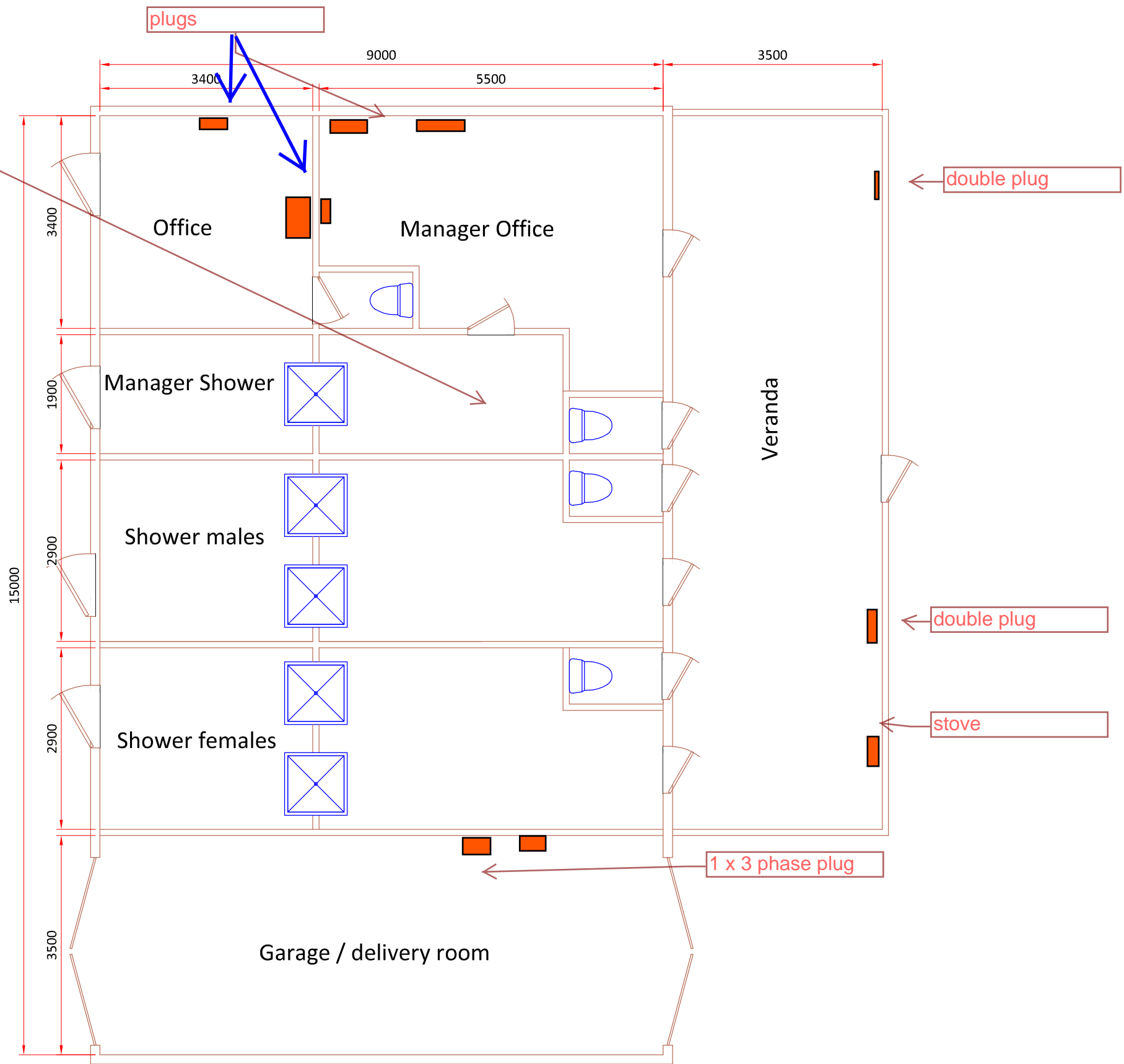
A3



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all lights are LED
and water proof



client: 4800 sow farm

Layout

Site Office

(mm) scale: 1:75

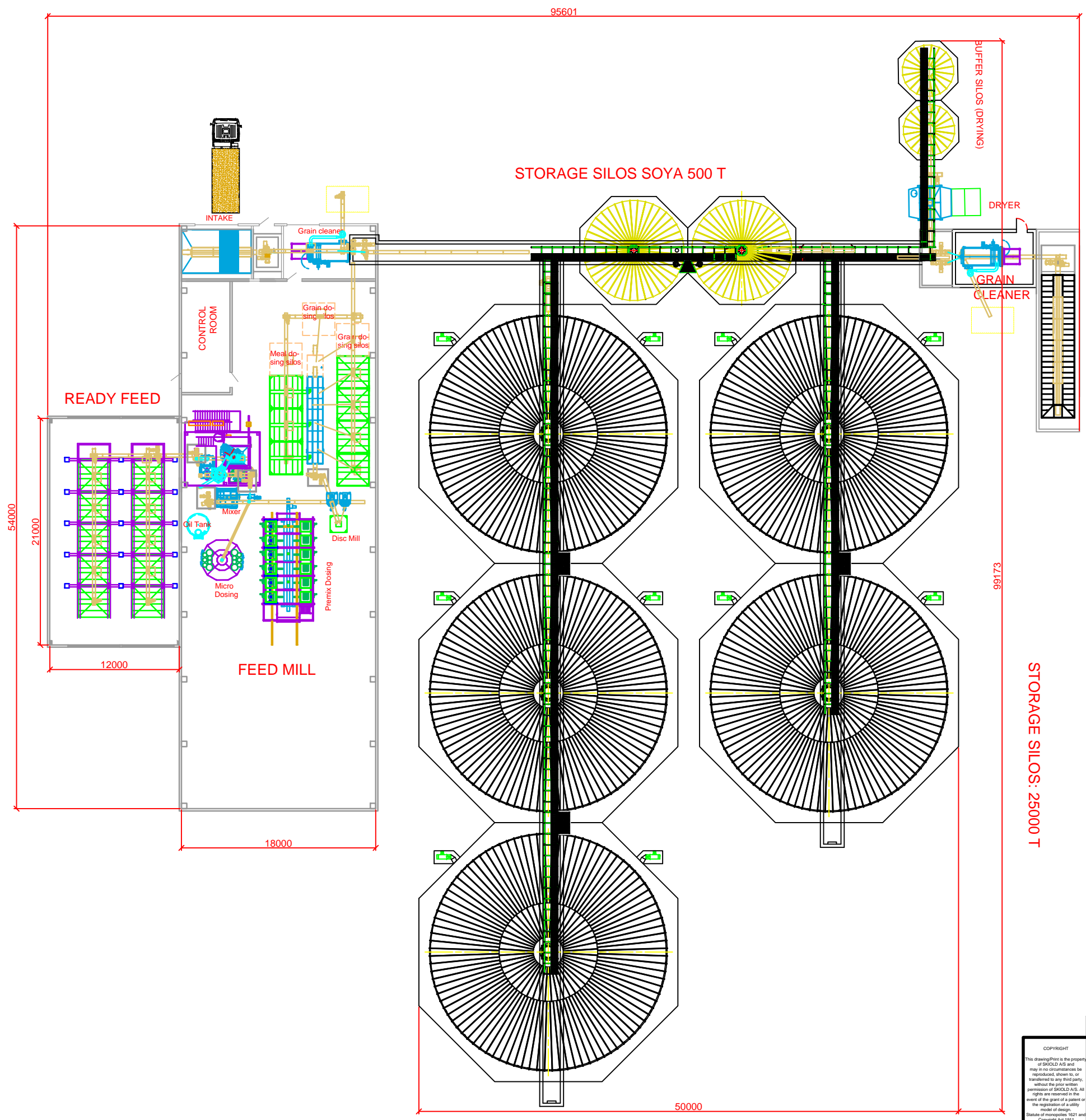
drawing: 80d

(y-m-d) date: 2016-07-04


drawn: Joost

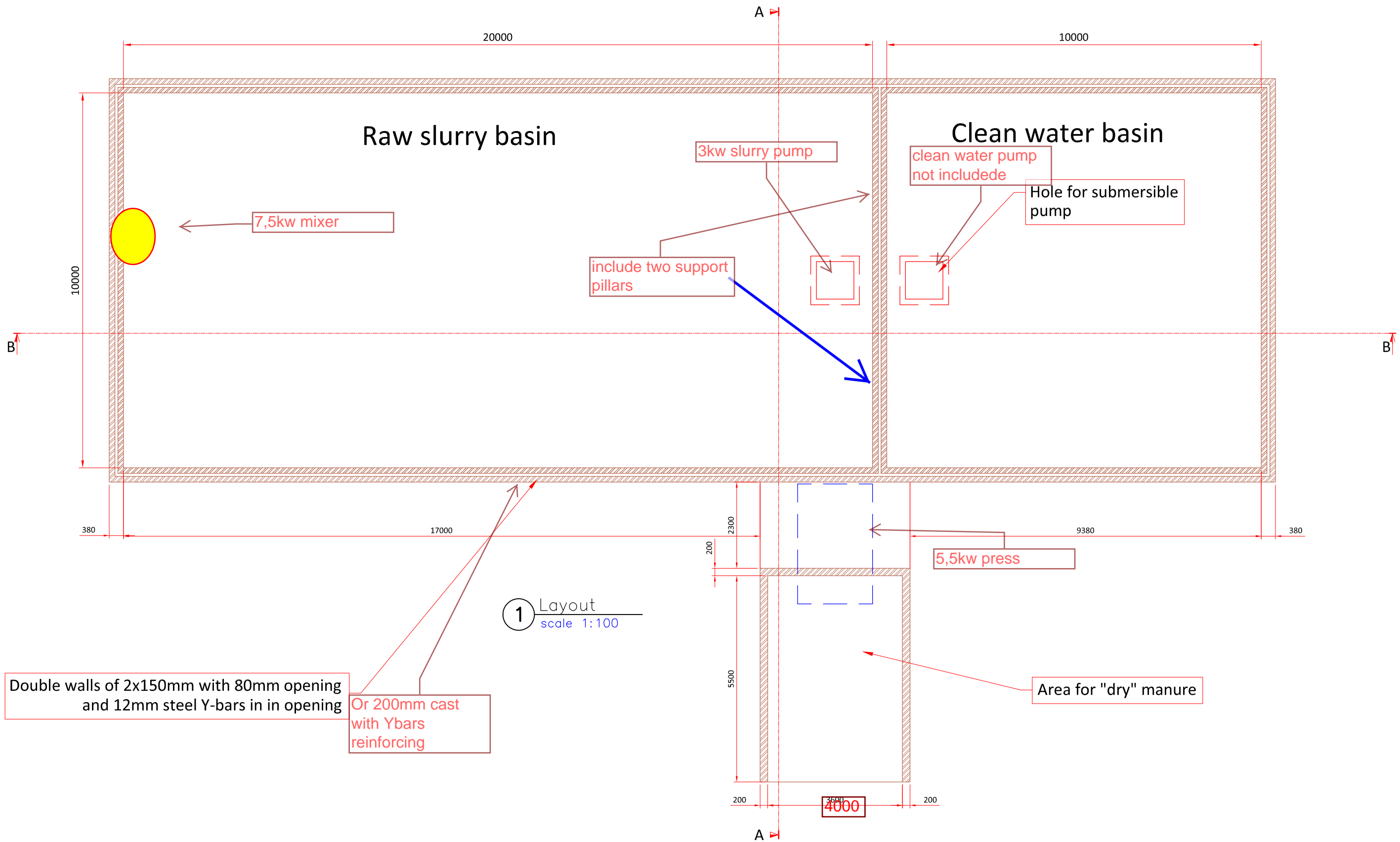
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		<table border="1"> <tr> <th>Revision</th> <th>Date</th> <th>Text</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	Revision	Date	Text						
	Revision	Date	Text								
SKIOLD FEED MILL 10 TPH(PEL) 25000 GRAIN LAYOUT Type: FL2-SK10/2-PTS2-(PEL)	<table border="1"> <tr> <td>Scale: <input checked="" type="checkbox"/></td> <td>Sign: JNE</td> <td>Date: 010616</td> </tr> <tr> <td>Checked by:</td> <td colspan="2"> </td> </tr> </table>	Scale: <input checked="" type="checkbox"/>	Sign: JNE	Date: 010616	Checked by:						
Scale: <input checked="" type="checkbox"/>	Sign: JNE	Date: 010616									
Checked by:											
		388-3452									



Project size: 4800 sows
Manure storage / treatment

Layout
Manure storage / treatment

(mm) scale: 1:~
(y-m-d) date: 2016-07-19

drawing: 90a
drawn: Joost

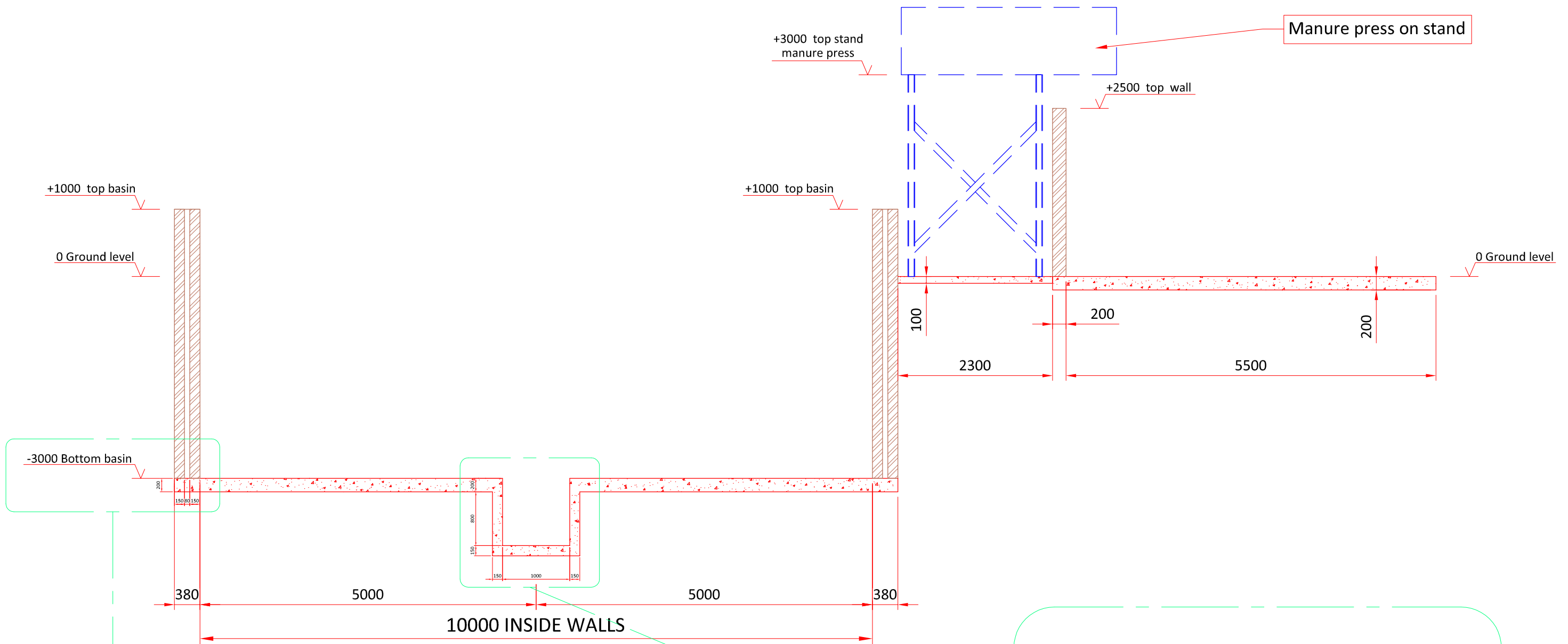
A3

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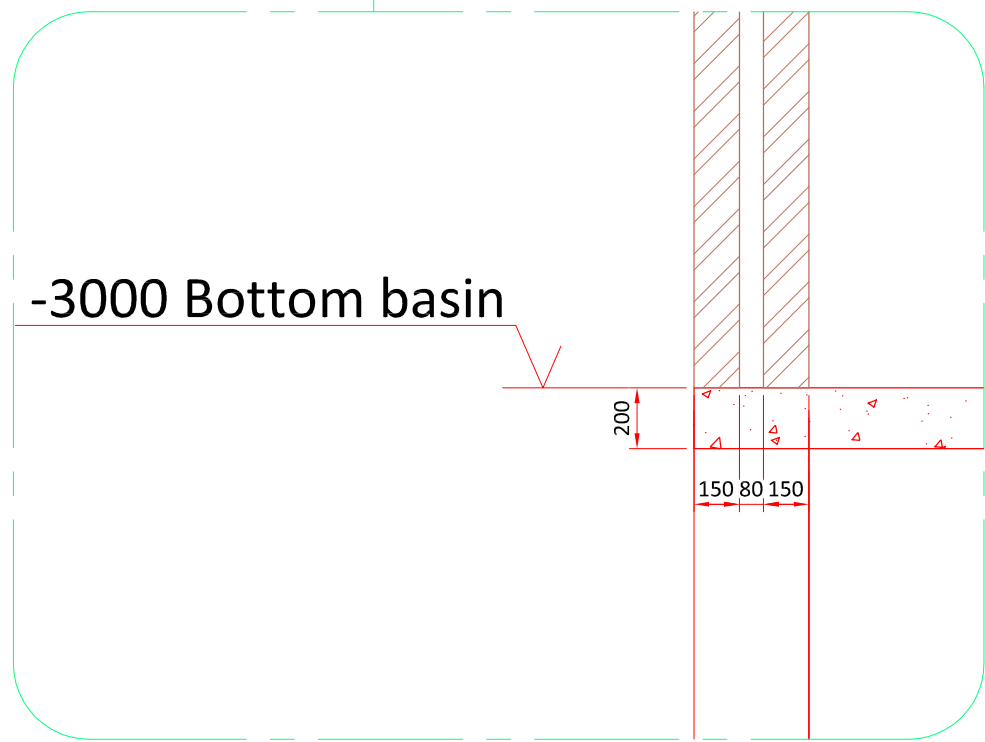
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| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

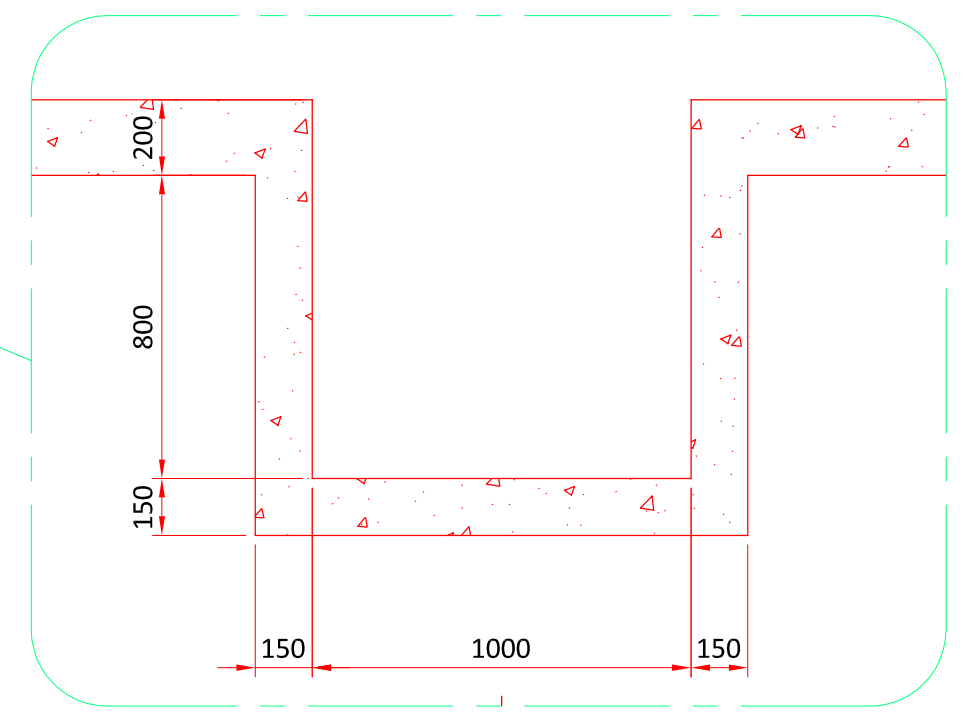
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1 View A-A
scale 1:60



2 Detail
scale 1:25



3 Detail
scale 1:20

Project size: 4800 sows
Manure storage / treatment

View A-A
Manure storage / treatment

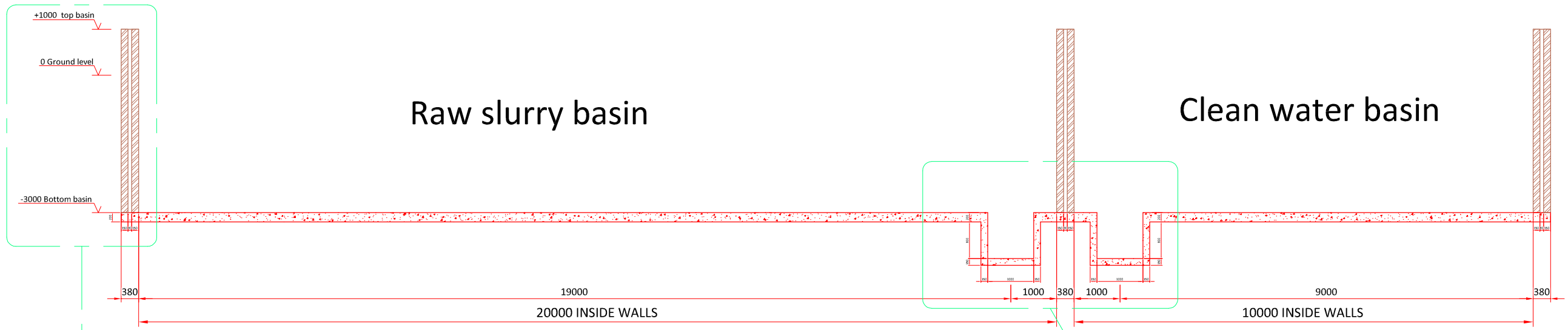
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(y-m-d) date: 2016-07-19

drawing: 91
drawn: Joost

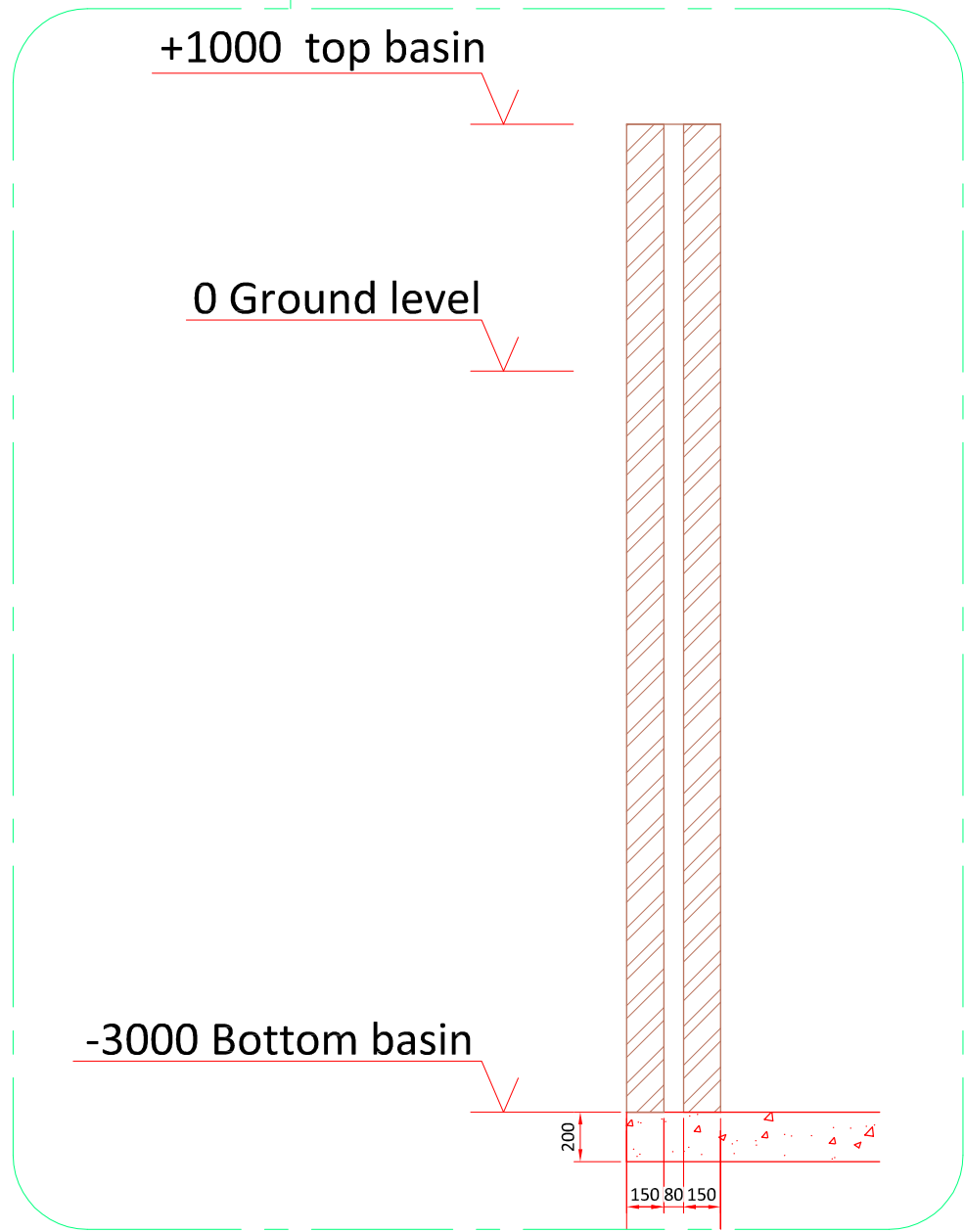
A3

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 | feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

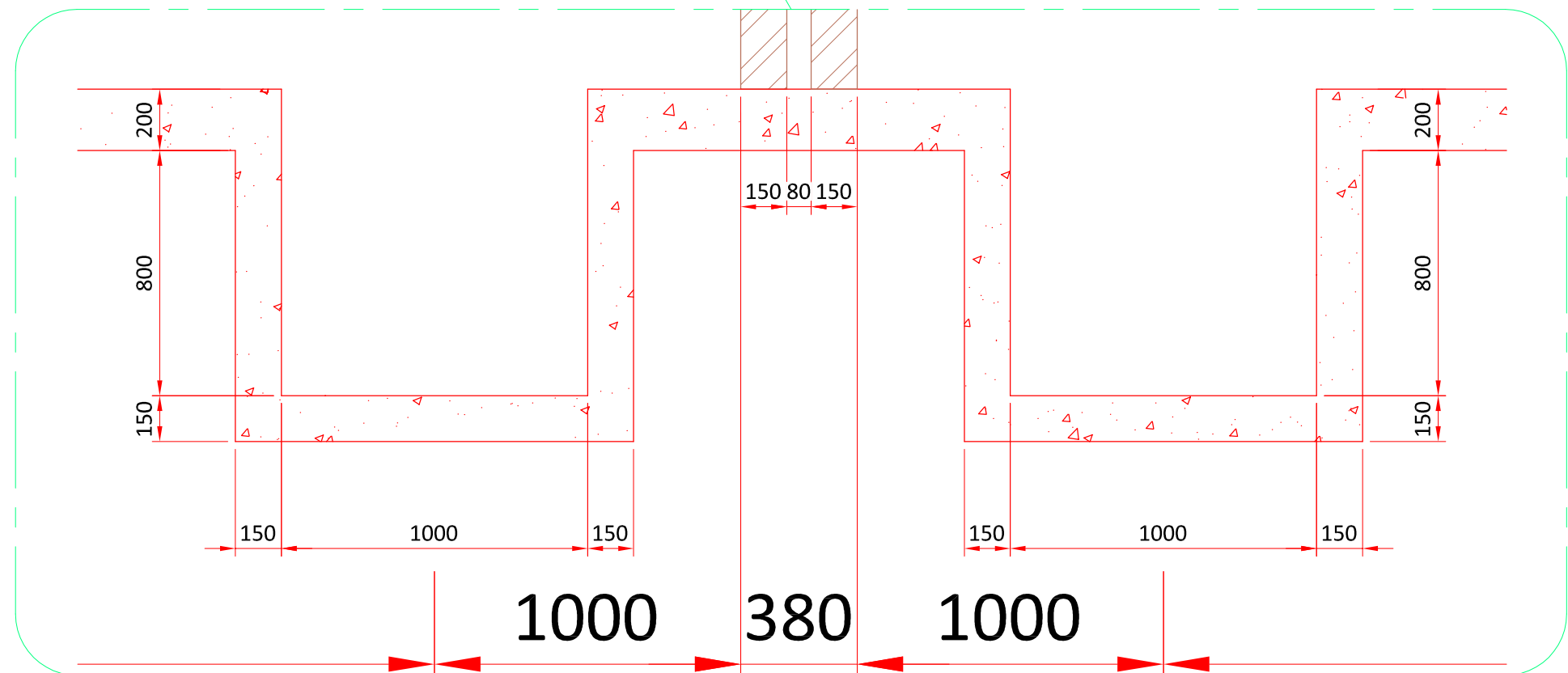
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1 View B-B
scale 1:100



2 Detail
scale 1:30



3 Detail
scale 1:20

Project size: 4800 sows
Manure storage / treatment

View B-B
Manure storage / treatment

(mm) scale: 1:~
(y-m-d) date: 2016-07-19

drawing: 92
drawn: Joost

A3

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APPENDIX 5

PROOF OF PAYMENT OF ENVIRONMENTAL AUTHORIZATION FEES (IF APPLICABLE). PROOF OF PAYMENT INCLUDES A STAMPED DEPOSIT SLIP OR AN ELECTRONIC FUND TRANSFER PAYMENT ADVICE.



EA

Absa Online: Notice of Payment

20 February 2017

Dear STEYNSBURG PORK AND ABATTOIR PTY LTD

Subject: Notice Of Payment: kwazulu natal provin

Please be advised that you made a payment to kwazulu natal provin as indicated below.

Transaction number:	80475347F2-1
Payment date:	2017-02-20
Payment made from:	Current account
Payment made to:	kwazulu natal provin
Beneficiary bank name:	Absa
Beneficiary account number:	4072482787
Bank branch code:	632005
For the amount of:	2,000.00
Immediate interbank payment :	N
Reference on beneficiary statement:	04003903
Additional comments by payer:	

Please remember that the following apply to Absa Online payments to non-ABSA bank accounts.

- Payments made on weekdays before 15:30 will be credited to the receiving bank account by midnight of the same day.
- Payments made on weekdays after 15:30 will be credited by midnight of the following day.
- Payments made on a Saturday, Sunday or Public holiday will be credited to the account by midnight of the 1st following weekday.

If you need more information or assistance, please call us on 08600 08600 or +27 11 501 5110 (International calls).

If you have made an incorrect internet banking payment, please send an email to digital@absa.co.za

Yours sincerely

General Manager: Digital Channels

This document is intended for use by the addressee and is privileged and confidential. If the transmission has been misdirected to you, please contact us immediately. Thank you.

APPENDIX 6

A WRITTEN MOTIVATION EXPLAINING WHY THE PAYMENT OF ENVIRONMENTAL AUTHORIZATION FEES ARE NOT APPLICABLE (AN APPLICATION FOR A COMMUNITY BASED PROJECT FUNDED BY A GOVERNMENT GRANT OR AN APPLICATION BY AN ORGAN OF STATE).

N/A

APPENDIX 3A

LOCALITY MAP AND KZN CBA MAP



Sterkfontein Dam

Kilburn Dam

Proposed Piggery Site:
GPS Coordinates:
-28.658883° S
29.142586° E

Woodstock Dam

Spioenkop Dam

Bergville Piggery

Mkukwini

Bergville

Lesotho








Image © 2016 CNES / Astrium
Image © 2016 DigitalGlobe
© 2016 Google
© 2016 AfriGIS (Pty) Ltd.

Google earth

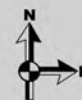
Steynsburg Piggery: Regional Locality

Legend

-  RE of the Farm Steynsburg 7803 GS
-  Farm Access Roads
-  Bridge
-  Siphon
-  Canal



t: 0129974742
f: 0129970415
P.O. Box 40541
Moreleta Park
0044
rock.chantel@lantic.net
www.rockeco.co.za



1 : 50 000

Locality Map

PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS, KWAZULU-NATAL

Access to Bergville piggery

Legend

- Access to Bergville piggery
- Amphitheatre Backpackers
- Bergville Manure Processing Plant
- Bergville Pig House 1
- Bergville Pig House 2
- Bergville Pig House 3
- Ethels Drive
- Feed Factory
- Saps - Ematsheni

























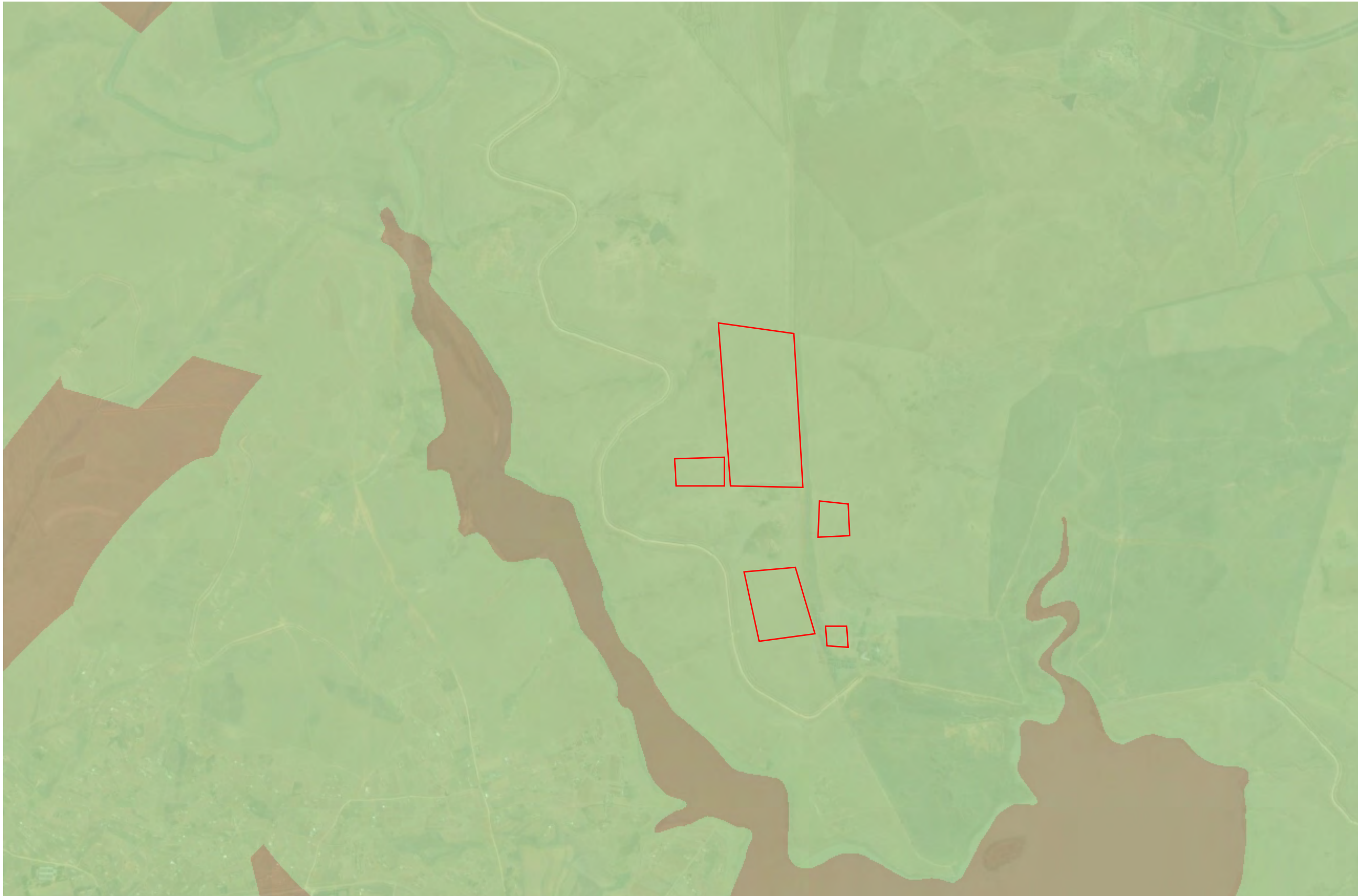
Description

PROPOSED 4800 SOW UNIT PIGGERY TO BE ESTABLISHED 21 KM NORTHWEST OF BERGVILLE ON THE REMAINING EXTENT OF THE FARM STEYNSBURG 7803-GS, KWAZULU-NATAL.

According to the Terrestrial Systematic Conservation Plan:
The site falls within the area of Not Conservation Significance (OCo) and Other natural area (Biodiversity Area). It does not fall within any of the 3 types of CBAs for the province..

Legend

-  KwaZulu-Natal Systematic conservation Plan
-  Local municipalities - LUDS
-  South African municipal boundaries 2009
-  South African parent farm cadaster
-  Formal protected areas (NBA 2011)
-  Informal protected areas (NPAES)
-  Marine Protected Areas MPAs (NBA 2011)
- KZN SCP - Terrestrial CBA map**
 -  Protected Area
 -  Critical Biodiversity Area (type 1 mandatory)
 -  Critical Biodiversity Area (type 2 mandatory)
 -  Critical Biodiversity Area (type 3 optimal)
 -  Other natural area (Biodiversity area)
 -  No natural remaining
 -  Outside province
- KZN SCP - Report Terrestrial CBA map lege**
 -  Existing Protected Area Network
 -  100% Transformed (2005 LC)
 -  Outside Province
-  Critical Biodiversity Area 1 Mandatory
 -  Critical Biodiversity Area 2 Mandatory
 -  Critical Biodiversity Area 3 Optimal
- Biodiversity Area**
- KZN SCP - Freshwater Conservation Plan**
 -  Available
 -  Conserved



1: 20 000




1,0 0 0,51 1,0 Kilometers



APPENDIX 3B

SENSITIVITY MAPS

BERGVILLE PIGGERY On the Remainder of the farm STEYNSBURG 7803

- Legend**
MAMMAL SENSITIVITY MAP
-  Low Sensitivity
 -  Pig House 1
 -  Pig House 2
 -  Pig House 3
 -  Manure Processing Plant
 -  Feed Factory
 -  500 m Extended Study Area



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www.galagoenvironmental.co.za










Map Compiled By: Rihann F. Geyser

Scale 1:16510



BERGVILLE PIGGERY On the Remainder of the farm STEYNSBURG 7803

Legend HERPETOFAUNAL SENSITIVITY MAP

-  Low Sensitivity
-  Pig House 1
-  Pig House 2
-  Pig House 3
-  Manure Processing Plant
-  Feed Factory
-  500 m Extended Study Area

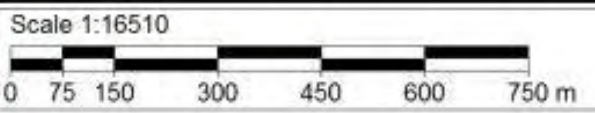


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Map Compiled By: Rihann F. Geysler



BERGVILLE PIGGERY On the Remainder of the farm STEYNSBURG 7803

Legend

AVIFAUNAL SENSITIVITY MAP

-  Low Sensitivity
-  Medium Sensitivity
-  High Sensitivity
-  Pig House 1
-  Pig House 2
-  Pig House 3
-  Manure Processing Plant
-  Feed Factory
-  500 m Extended Study Area



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Map Compiled By: Rihann F. Geyser

Scale 1:16440





BERGVILLE PIGGERY
On the Remainder of the farm
STEYNSBURG 7803

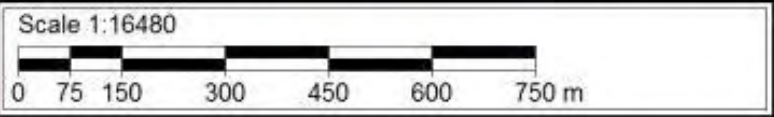
Legend

AQUATIC SENSITIVITY MAP






- High Sensitivity
- Pig House 1
- Pig House 2
- Pig House 3
- Manure Processing Plant
- Feed Factory
- 500 m Extended Study Area

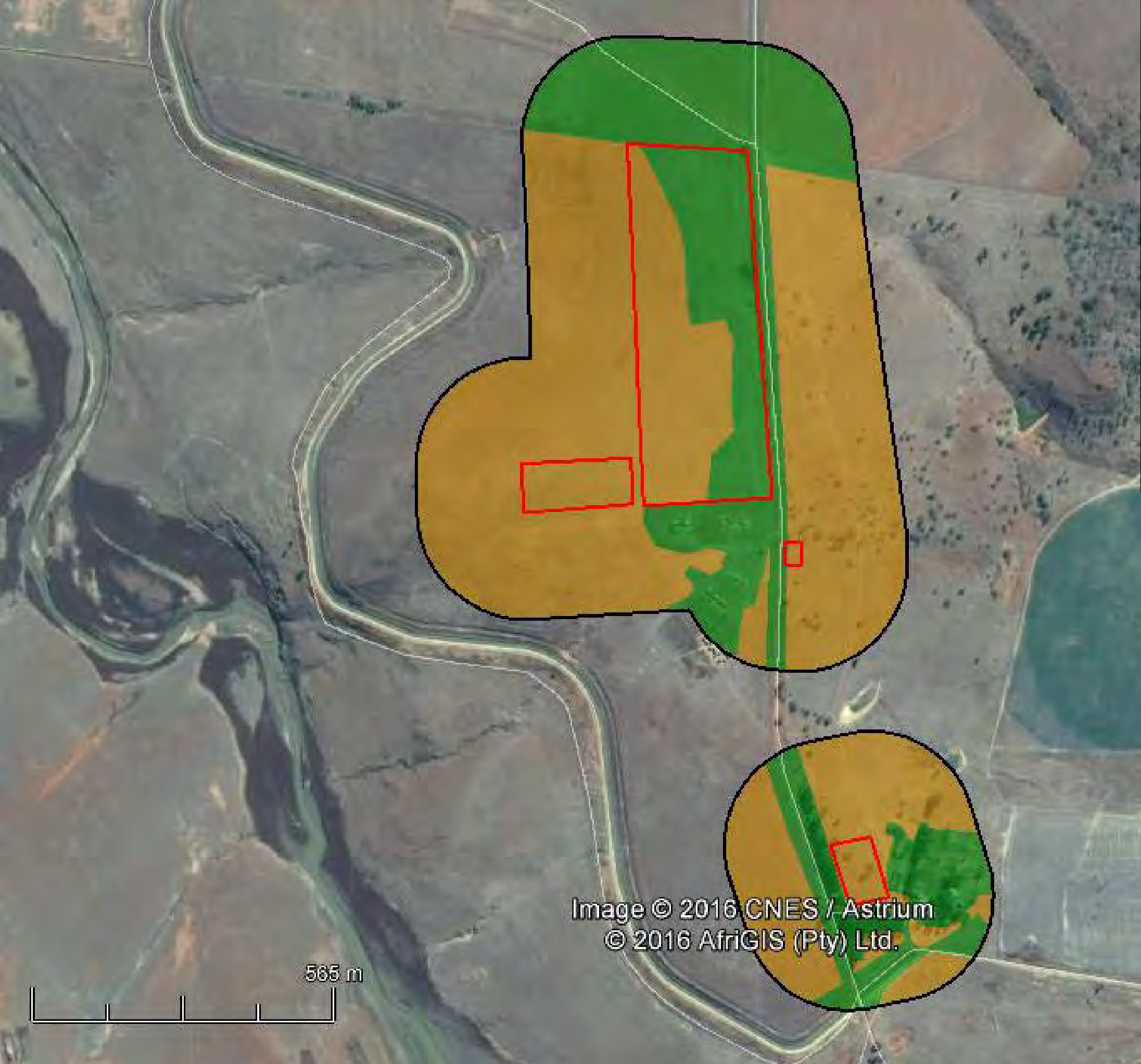
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Map Compiled By: Rihann F. Geyser



Vegetation Sensitivity Map

-  High sensitivity
-  Medium Sensitivity
-  Low Sensitivity
-  Study Site
-  200m buffer around Site



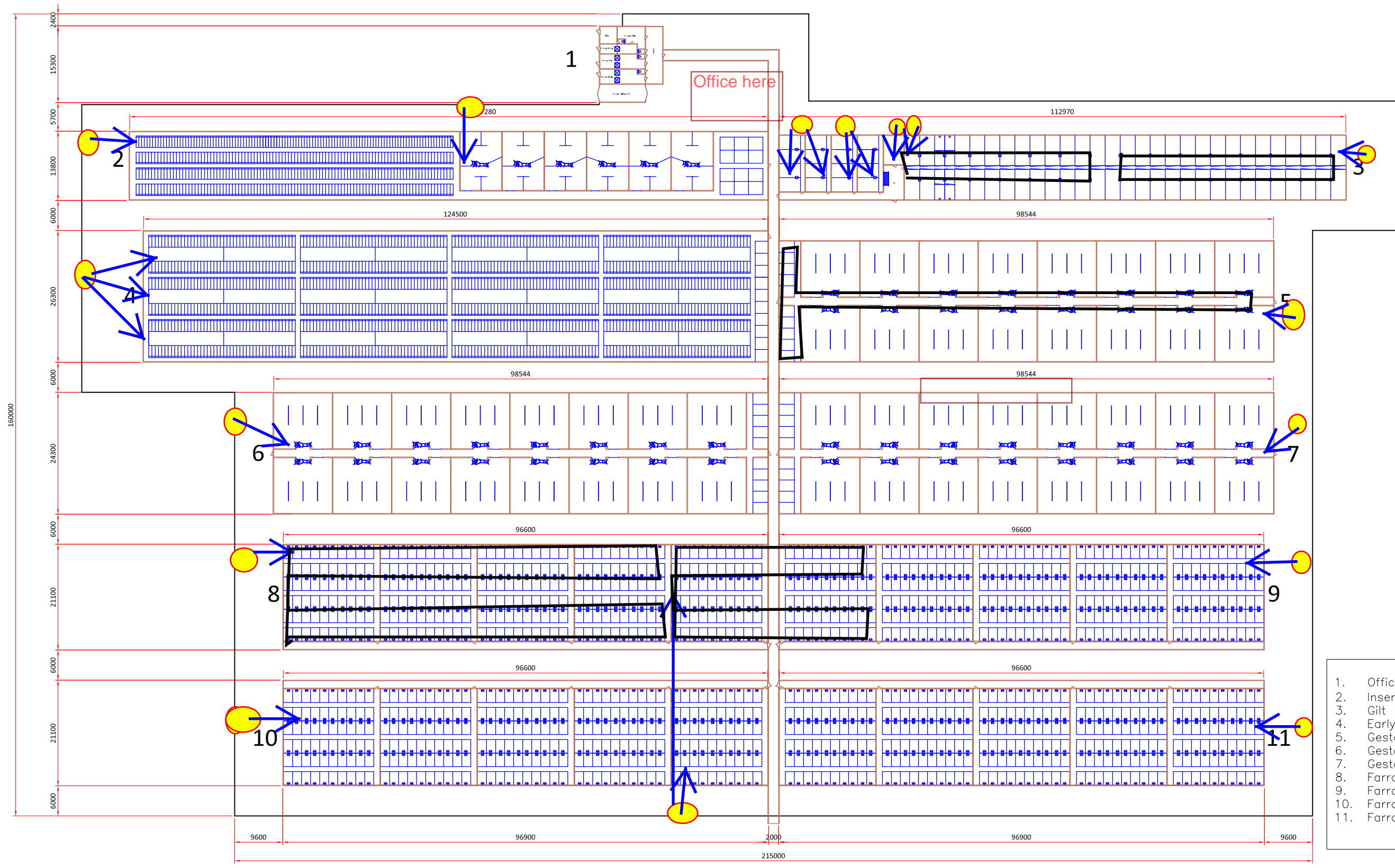
565 m

Image © 2016 CNES / Astrium
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Google earth

APPENDIX 4A

CONCEPTUAL LAYOUT PLAN



1. Office
2. Insemination/heat-detection/Insemination
3. Gilt development
4. Early Gestation
5. Gestation 1
6. Gestation 2
7. Gestation 3
8. Farrowing 1
9. Farrowing 2
10. Farrowing 3
11. Farrowing 4

Project size: 4800 sows

Layout
Site 1

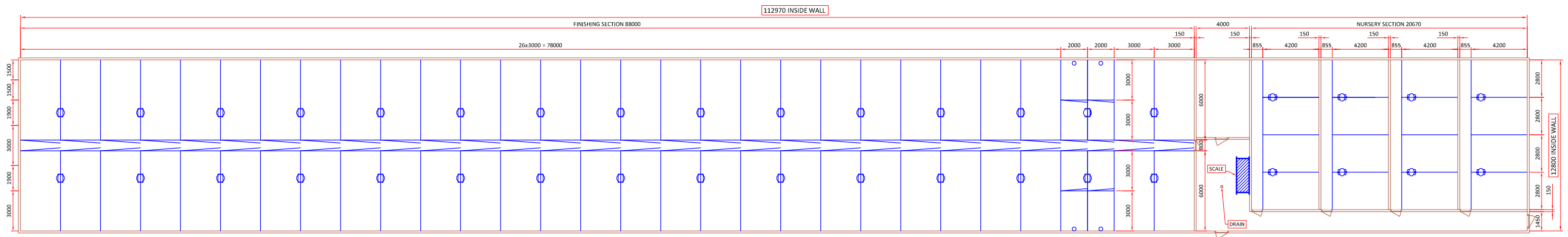
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(y-m-d) date: 2016-07-04

drawing: 80a
drawn: Joost

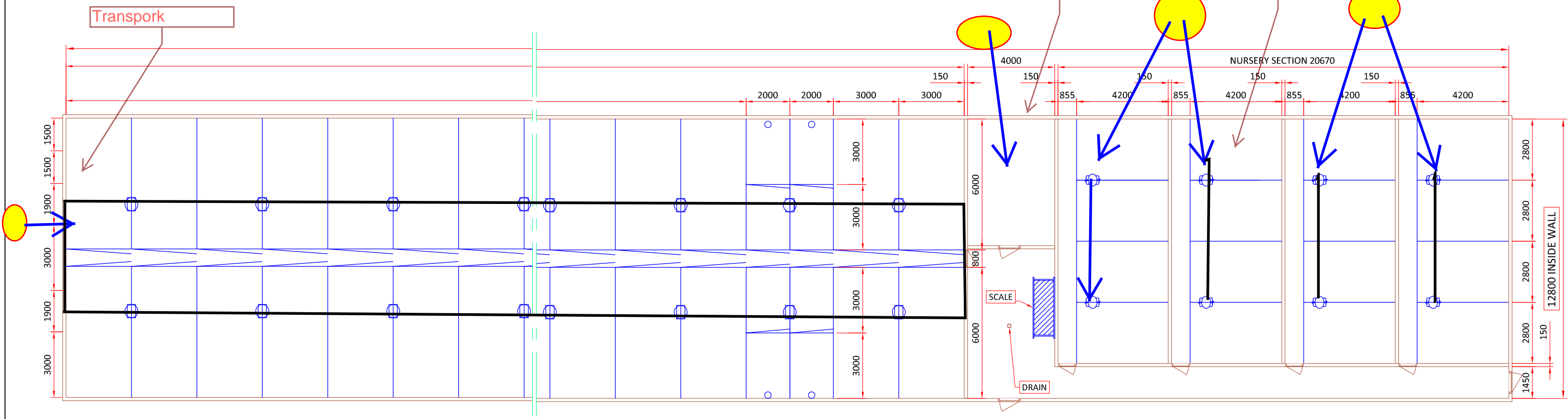
A3

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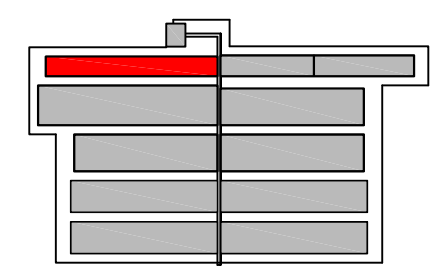
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2 Layout
scale 1:300



3 Detail
scale 1:175



1 Overview Site 1
scale 1:~

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

Layout
 Gilt development

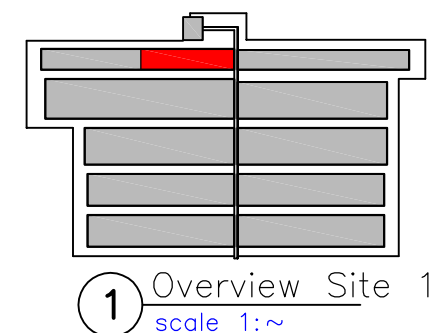
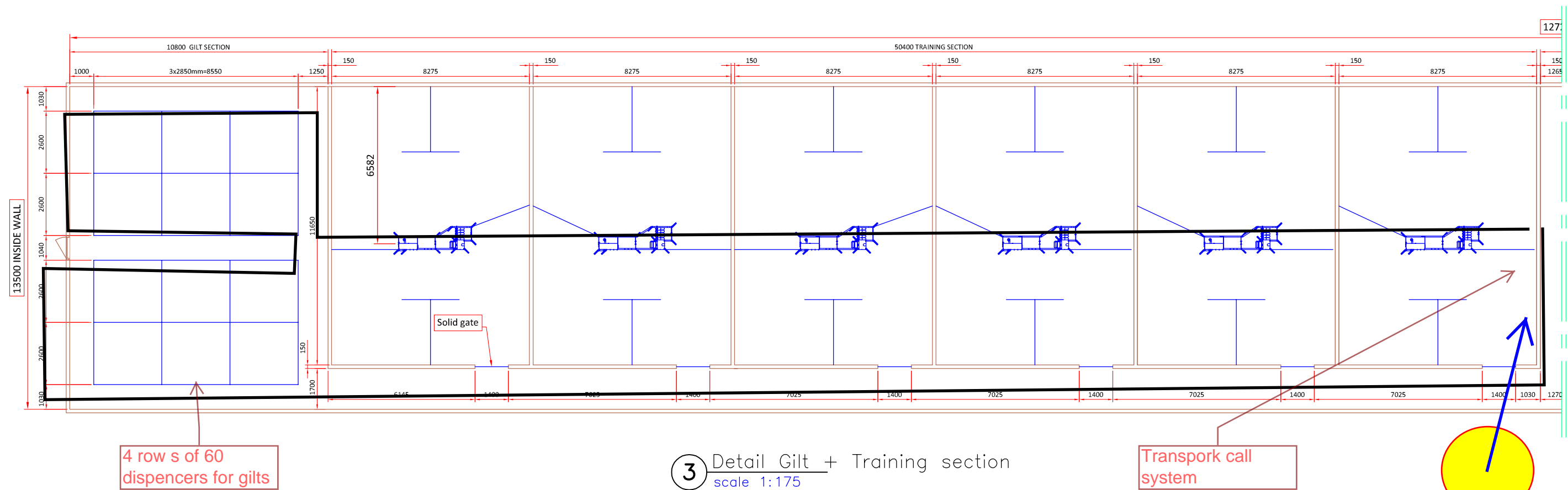
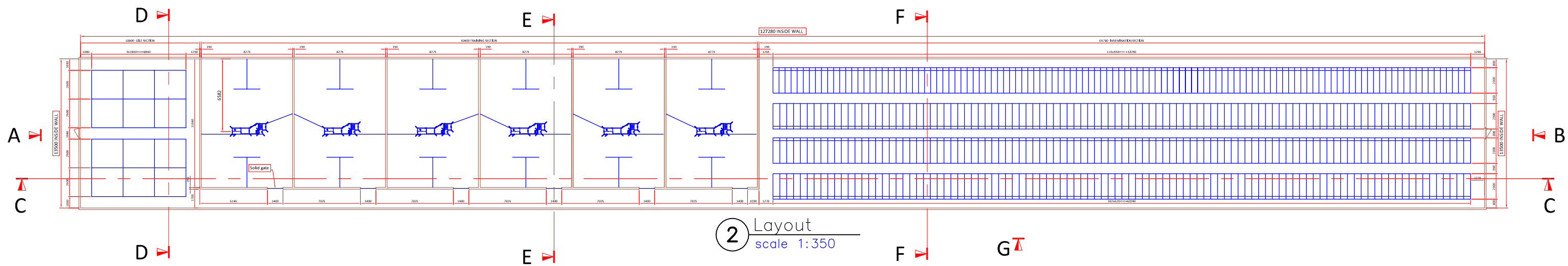
(mm) scale: 1:~
 (y-m-d) date: 2016-05-24

drawing: 10a
 drawn: Joost

A3

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Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

Layout
 Insemination - Heat detection and training

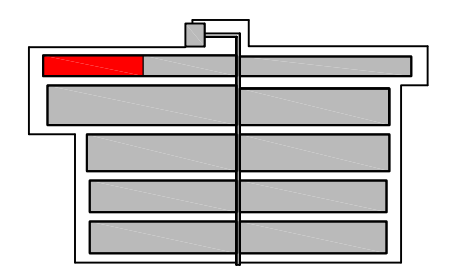
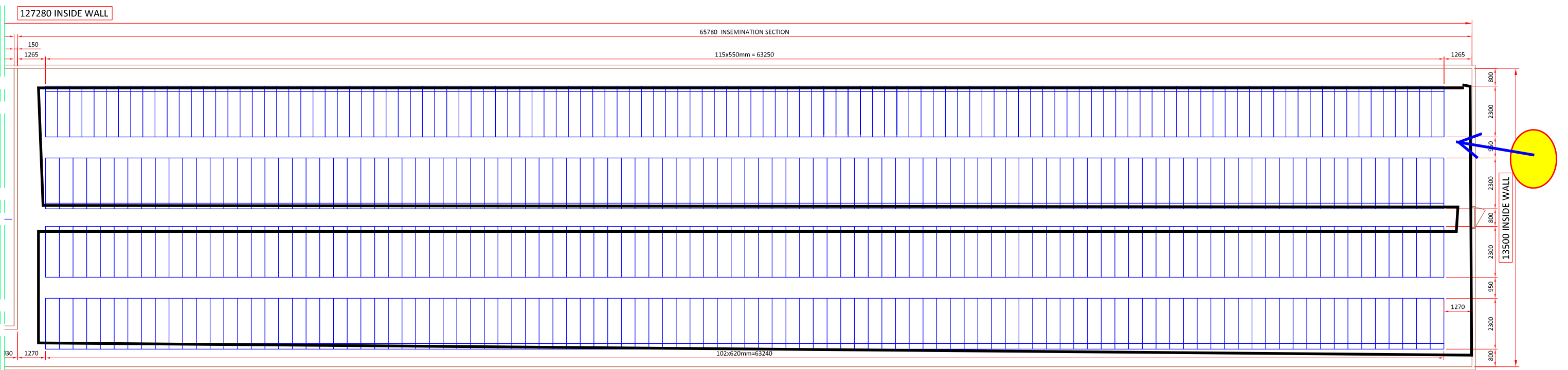
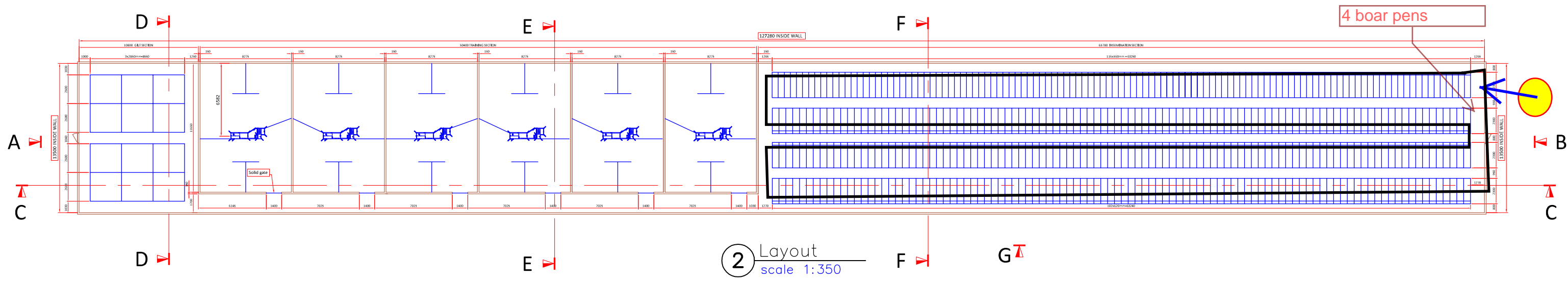
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 (y-m-d) date: 2016-05-24

drawing: 20a
 drawn: Joost

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Project size: 4800 sows
 1 building (training section):
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 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

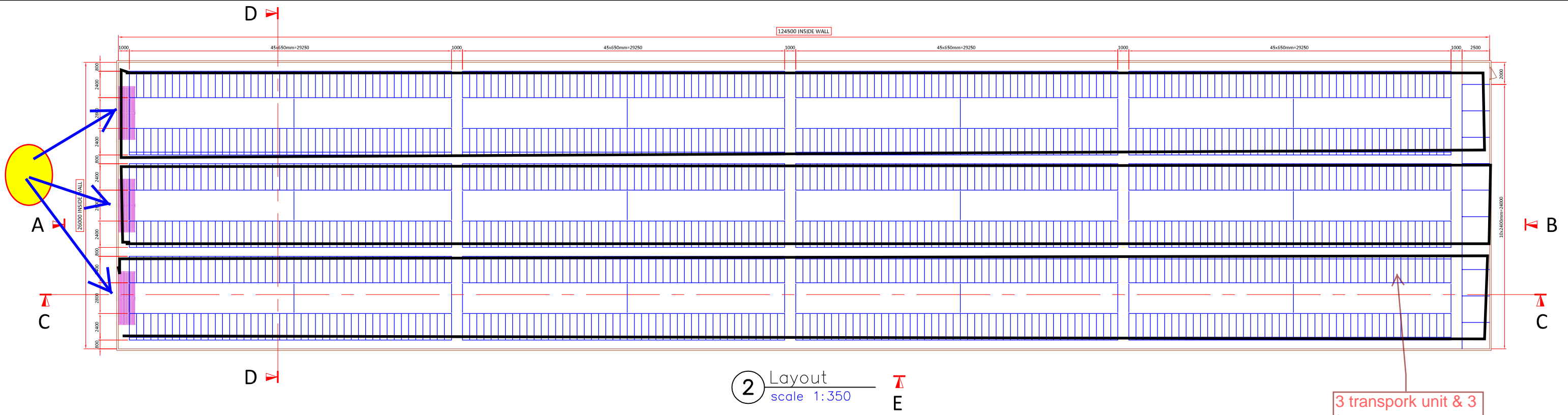
Layout
 Insemination - Heat detection and training

(mm) scale: 1:~ drawing: 20b
 (y-m-d) date: 2016-05-24 drawn: Joost

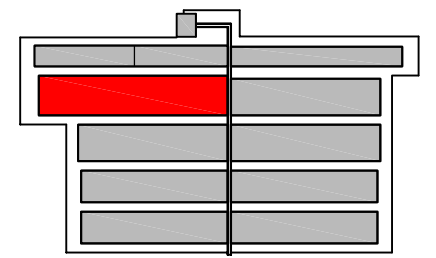
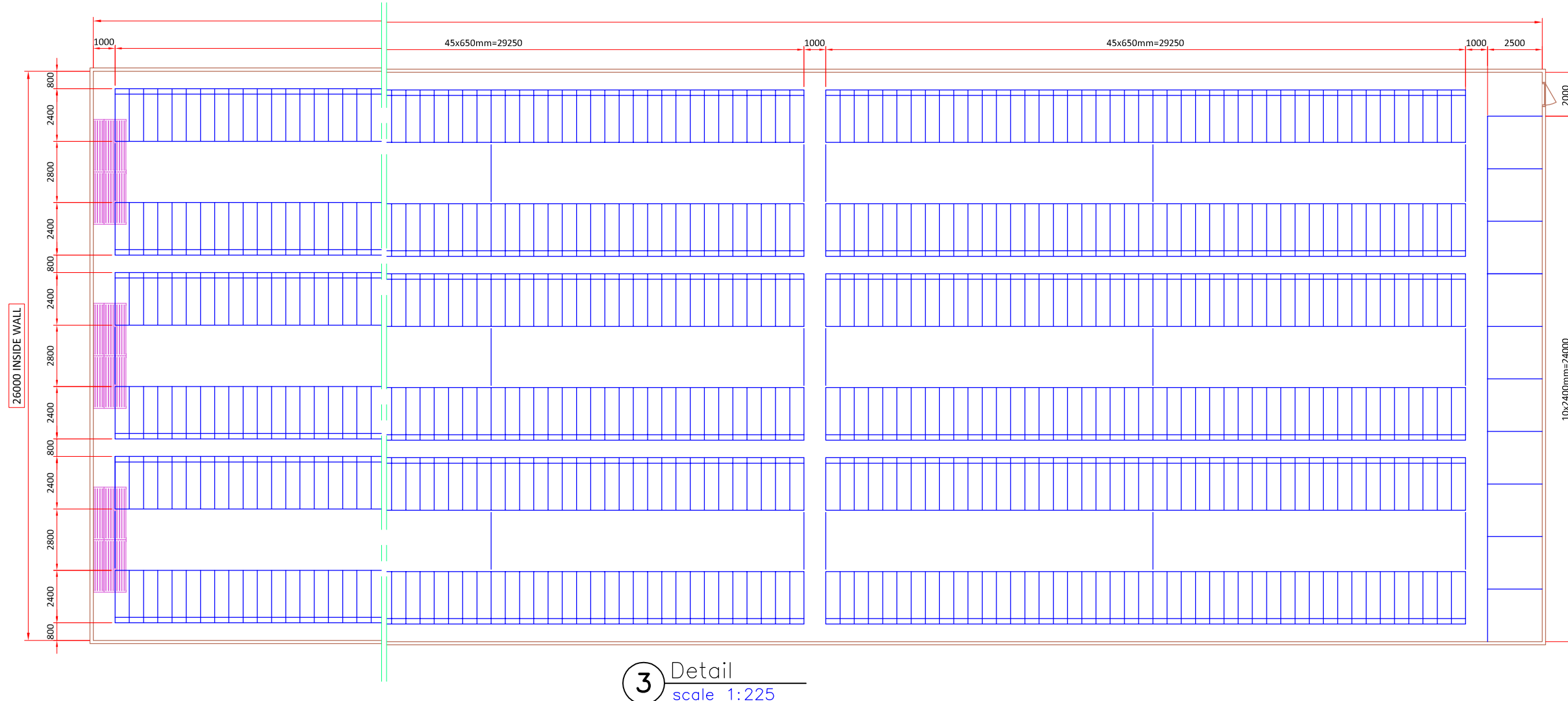
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3 transpork unit & 3 flex augers



Project size: 4800 sows
 1 building
 1 room with 18 rows of 60 stalls
 and 1 row of 10 group pens
 Total 1080 early gestation stalls

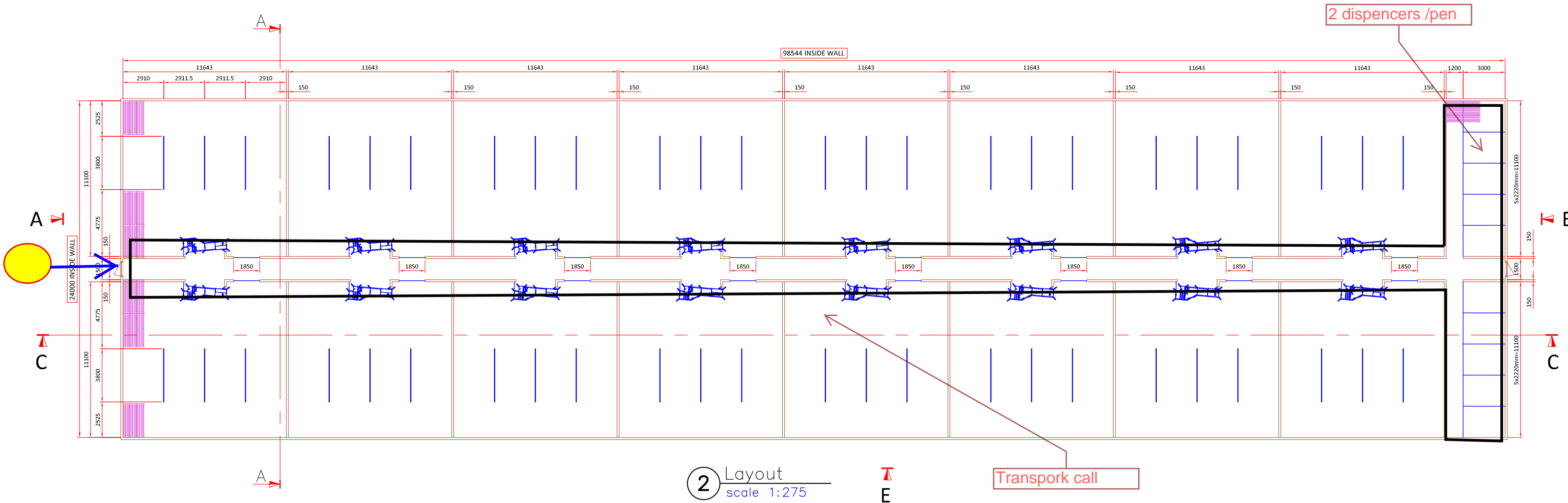
Layout
 Early Gestation

(mm) scale: 1:~ drawing: 30a
 (y-m-d) date: 2016-06-30 drawn: Joost

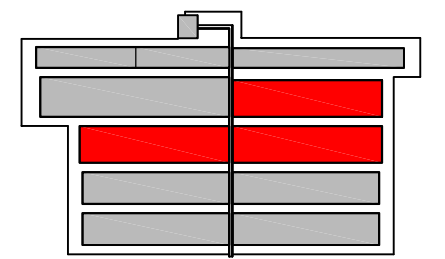
A3

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② Layout
scale 1:275



① Overview Site 1
scale 1:~

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

**Layout
Gestation**

(mm) scale: 1:~
 (y-m-d) date: 2016-07-04

drawing: 40a
 drawn: Joost

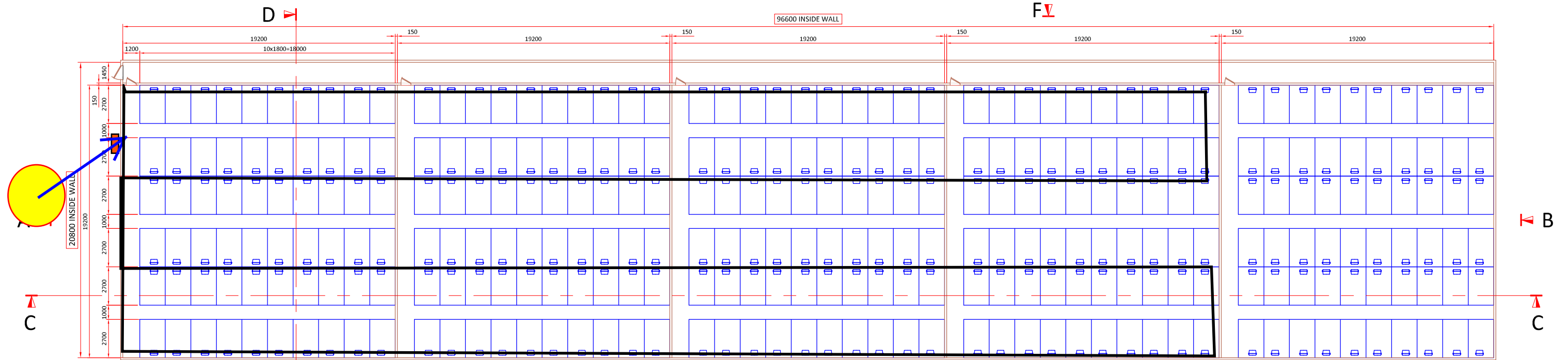
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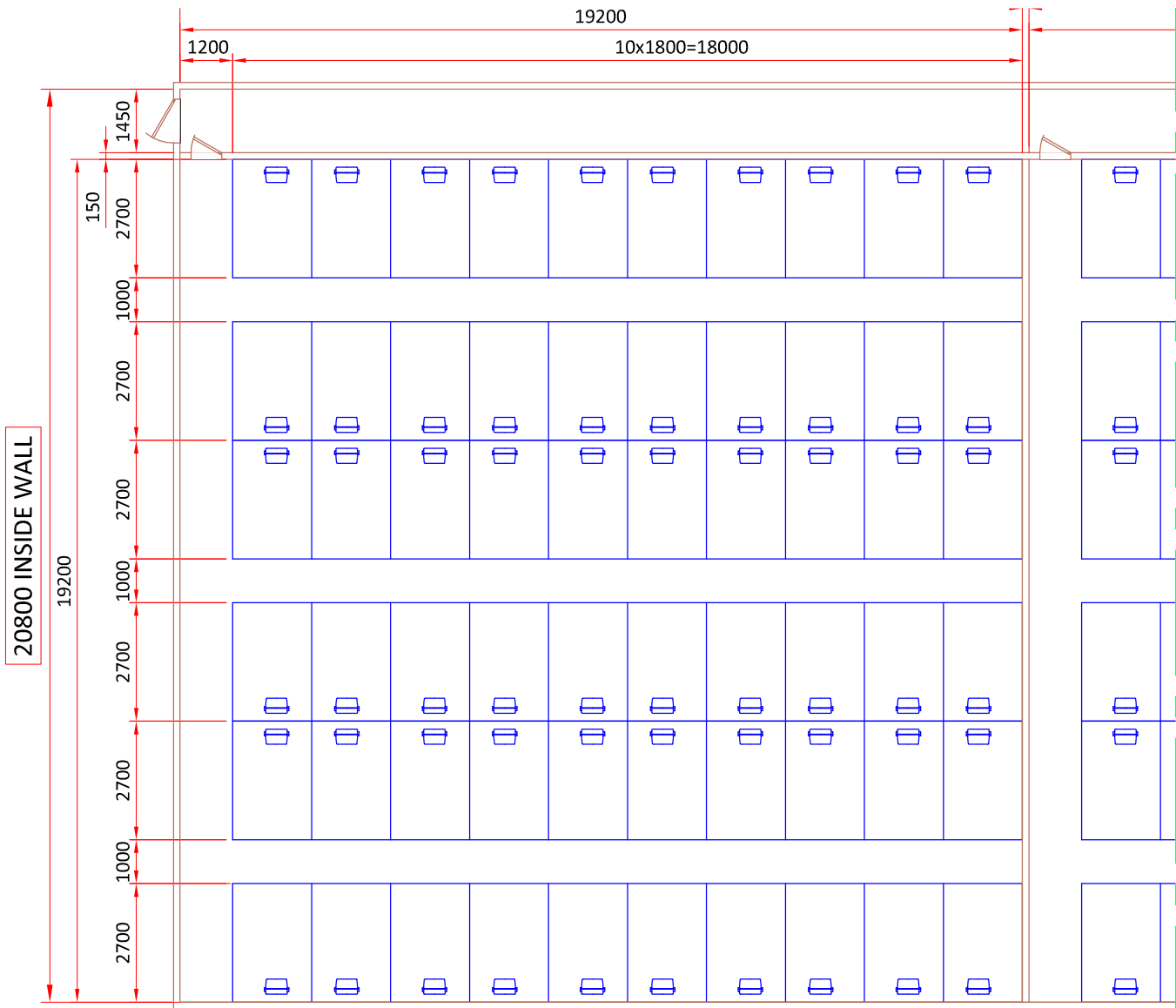
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| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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2 Layout
scale 1:275



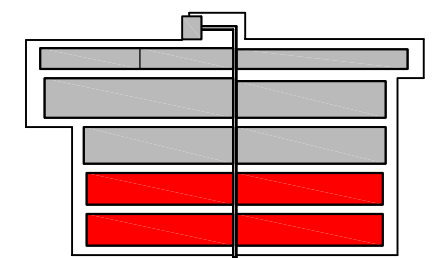
3 Detail
scale 1:150

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

Layout
Farrowing

(mm) scale: 1:~ drawing: 50a
 (y-m-d) date: 2016-05-25 drawn: Joost

A3

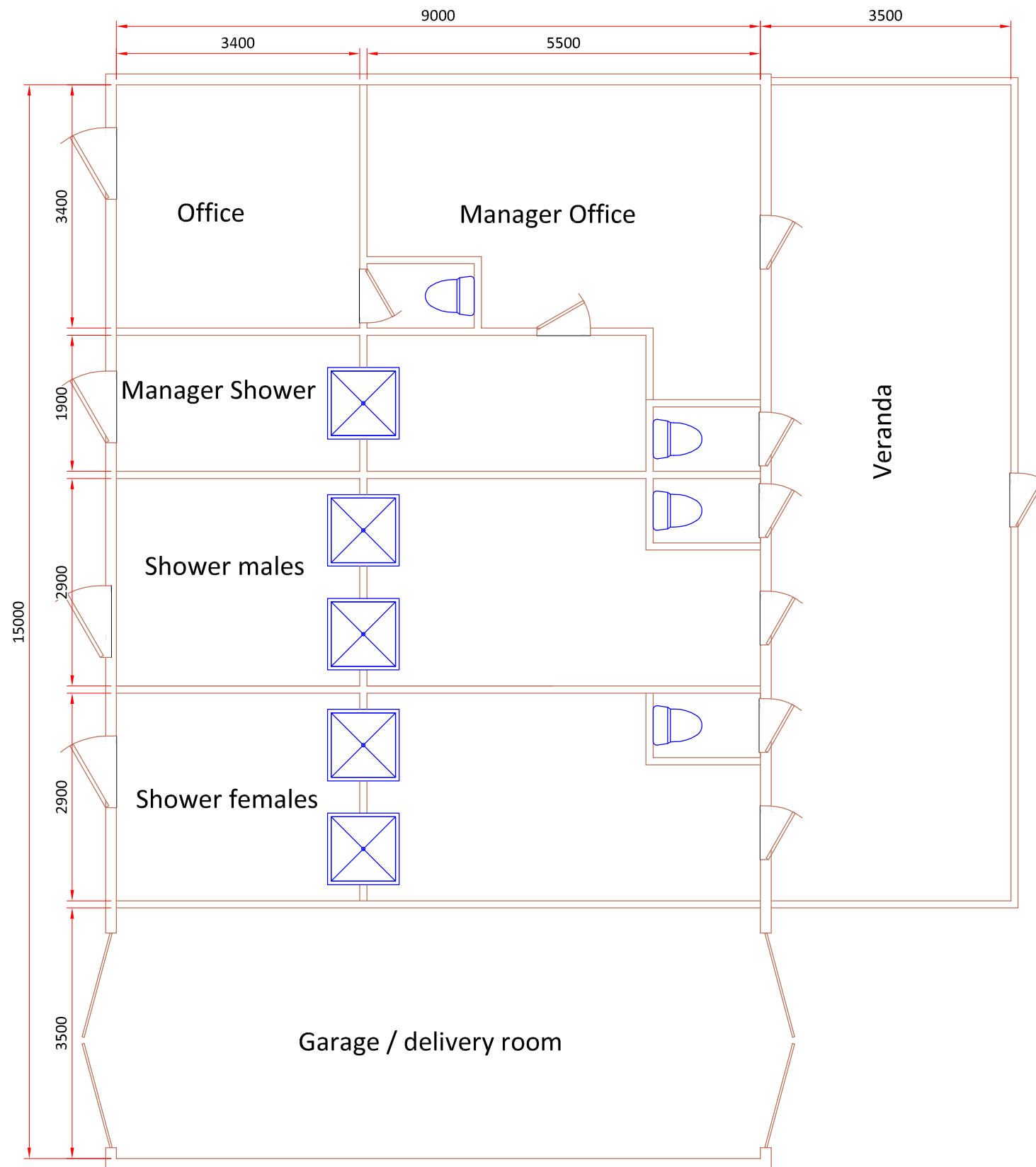


1 Overview Site 1
scale 1:~



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client: 4800 sow farm

Layout

Site Office

(mm) scale: 1:75

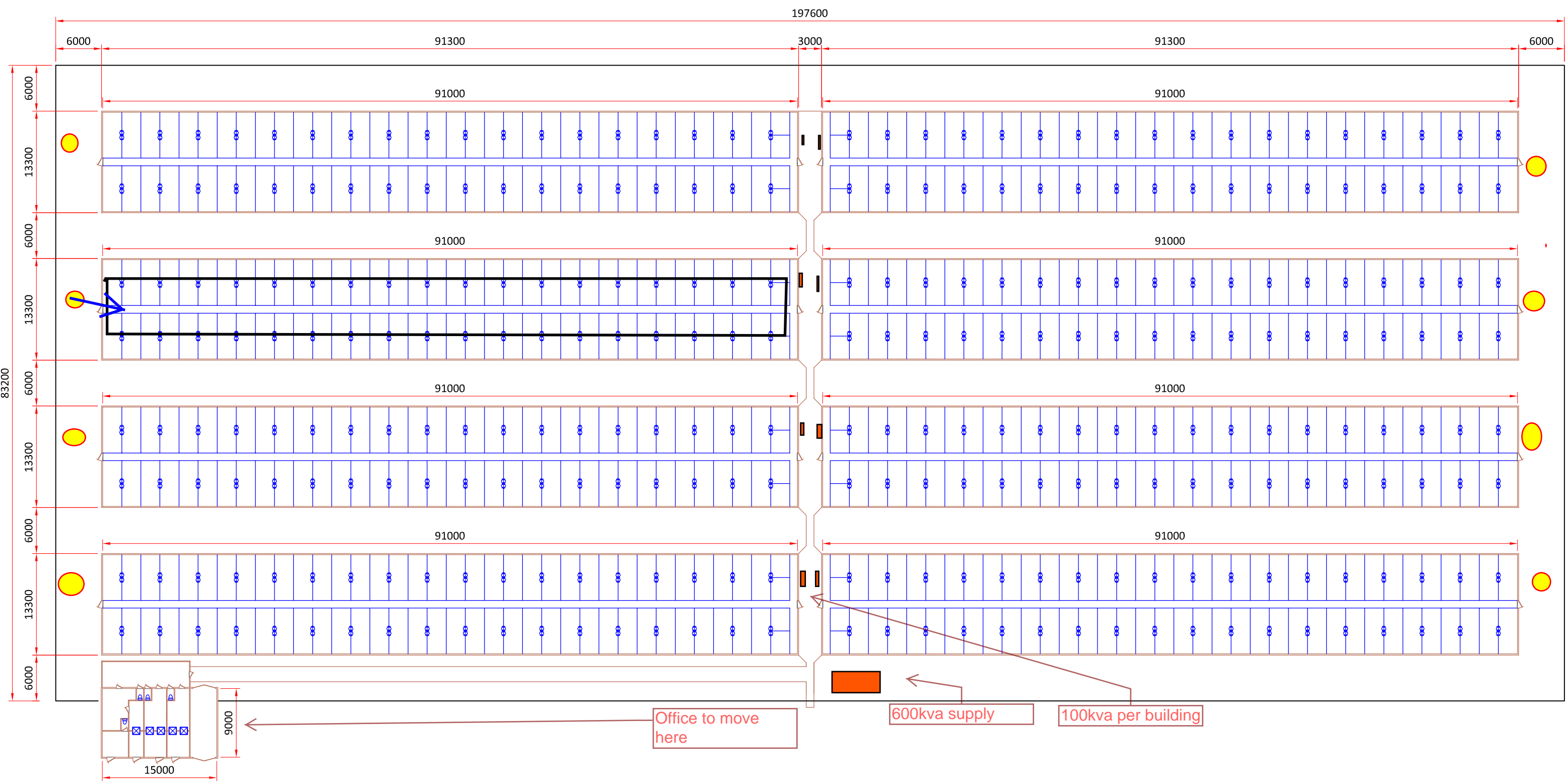
drawing: 80d

(y-m-d) date: 2016-07-04

drawn: Joost

A3

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client: 4800 sow farm
 8 buildings with per building:
 2 rows of 35 nursery pens 2500x6000mm and 2
 special care pens of 2500x3000mm
 Total 560 Nursery pens and 32 special care pens

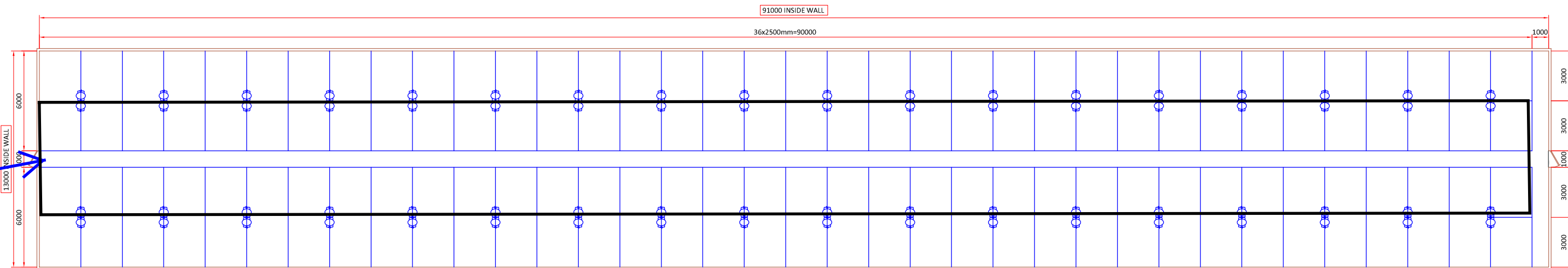
Layout
Site 2

(mm) scale: 1:500 drawing: 80b
 (y-m-d) date: 2016-07-04 drawn: Joost

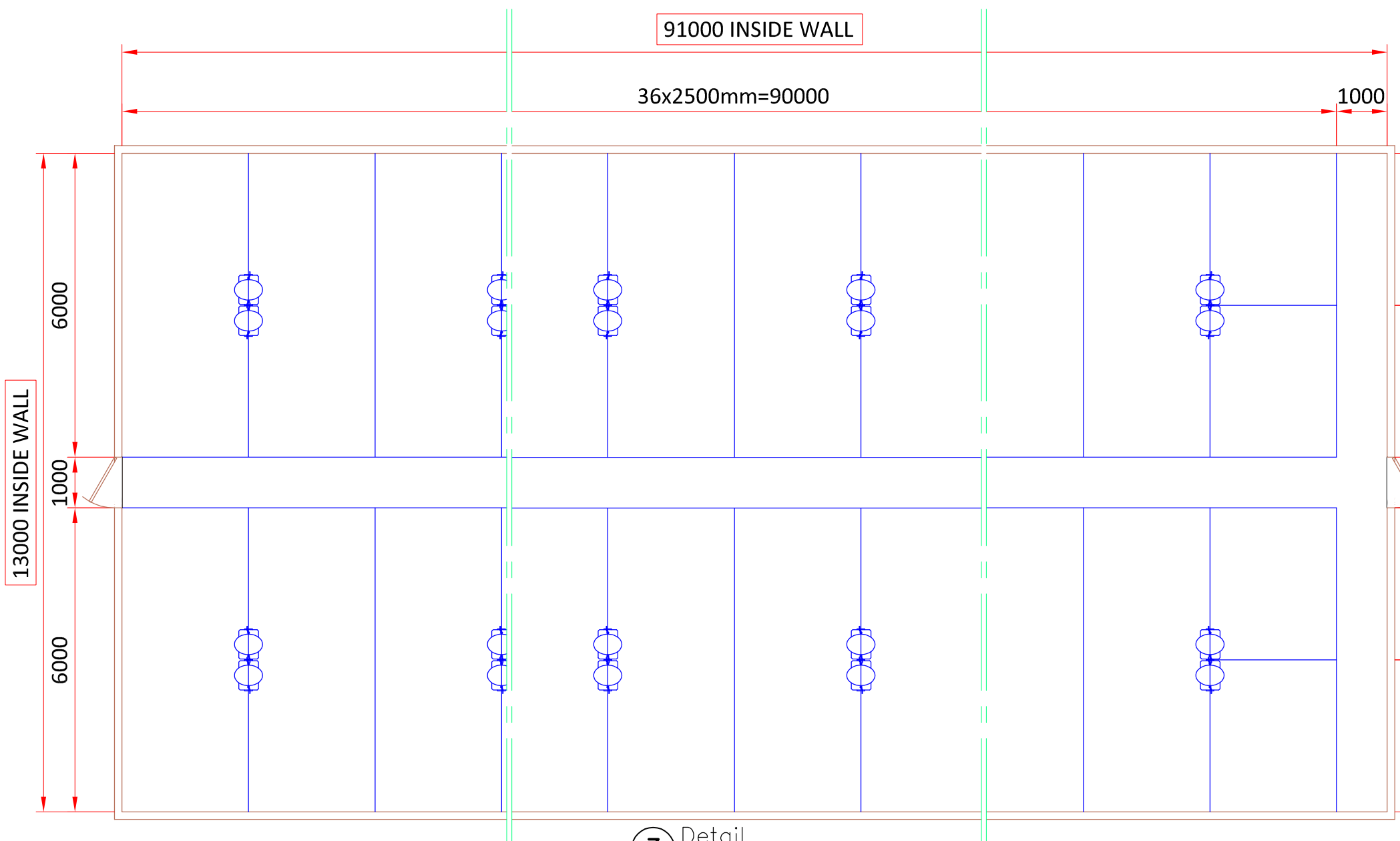
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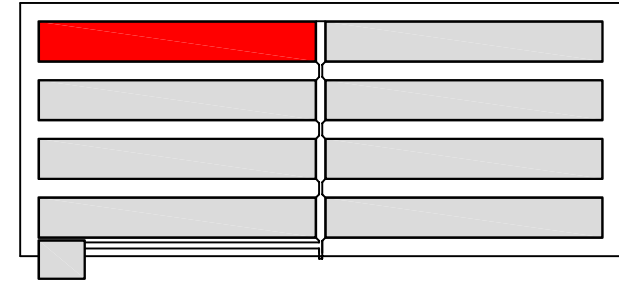
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2 Layout
scale 1:250



3 Detail
scale 1:100



1 Site 2
scale 1:~

client: 4800 sow farm
8 buildings with per building:
2 rows of 35 nursery pens 2500x6000mm and 2
special care pens of 2500x3000mm
Total 560 Nursery pens and 32 special care pens

**Layout
Nursery**

(mm) scale: 1:~ drawing: 60a
(y-m-d) date: 2016-02-12 drawn: Joost

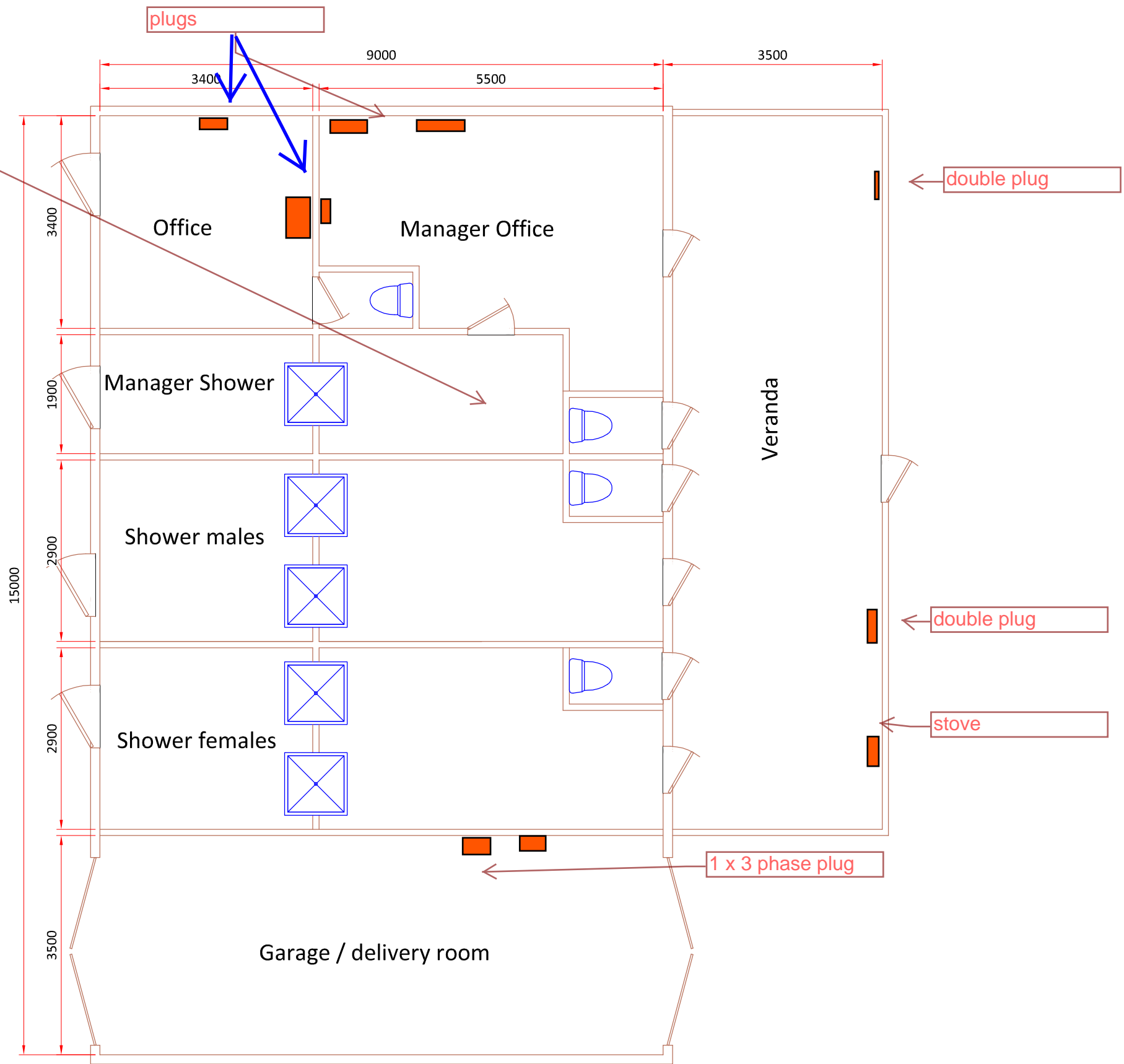
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all lights are LED
and water proof



client: 4800 sow farm

Layout

Site Office

(mm) scale: 1:75

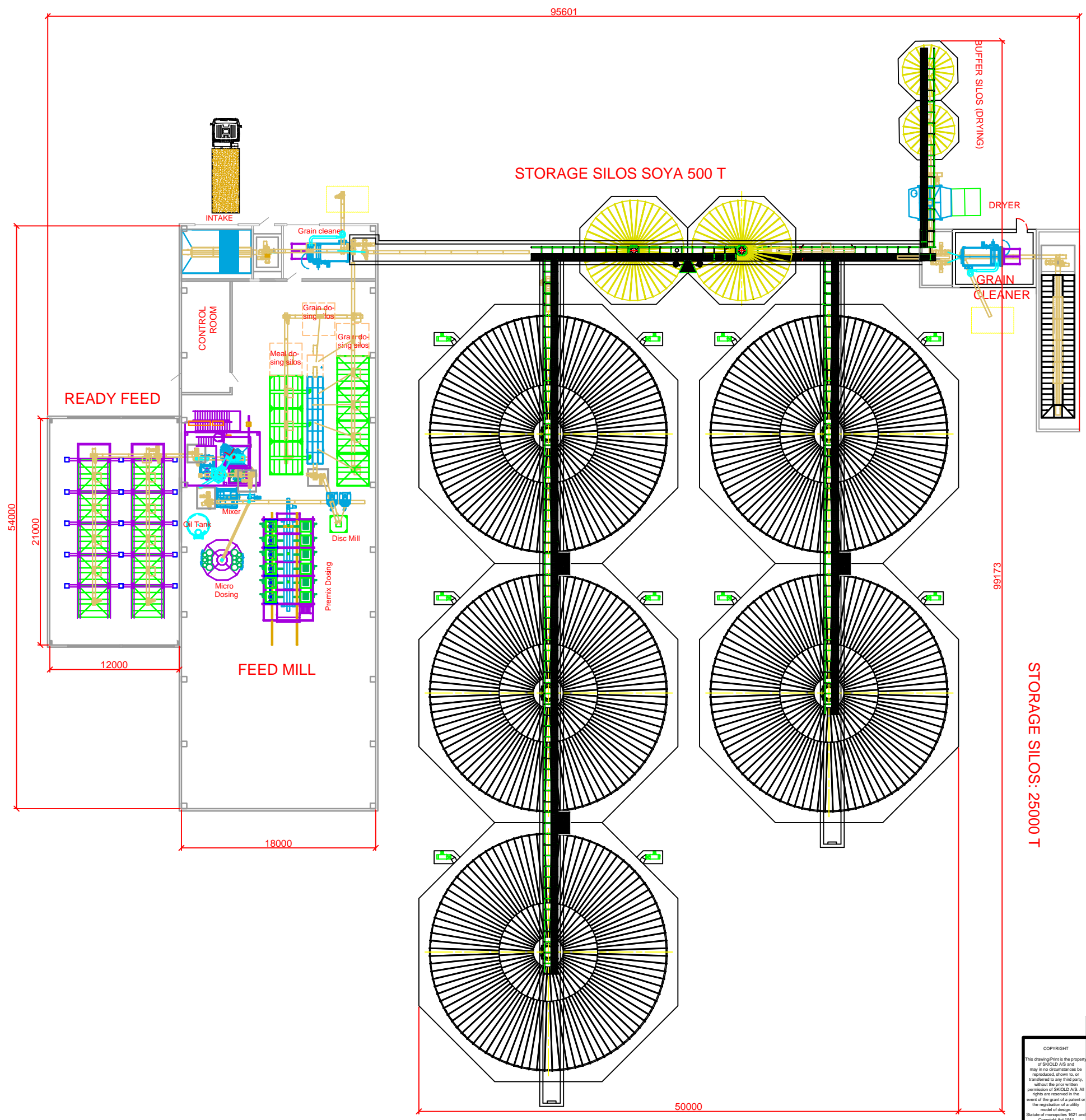
drawing: 80d

(y-m-d) date: 2016-07-04


drawn: Joost

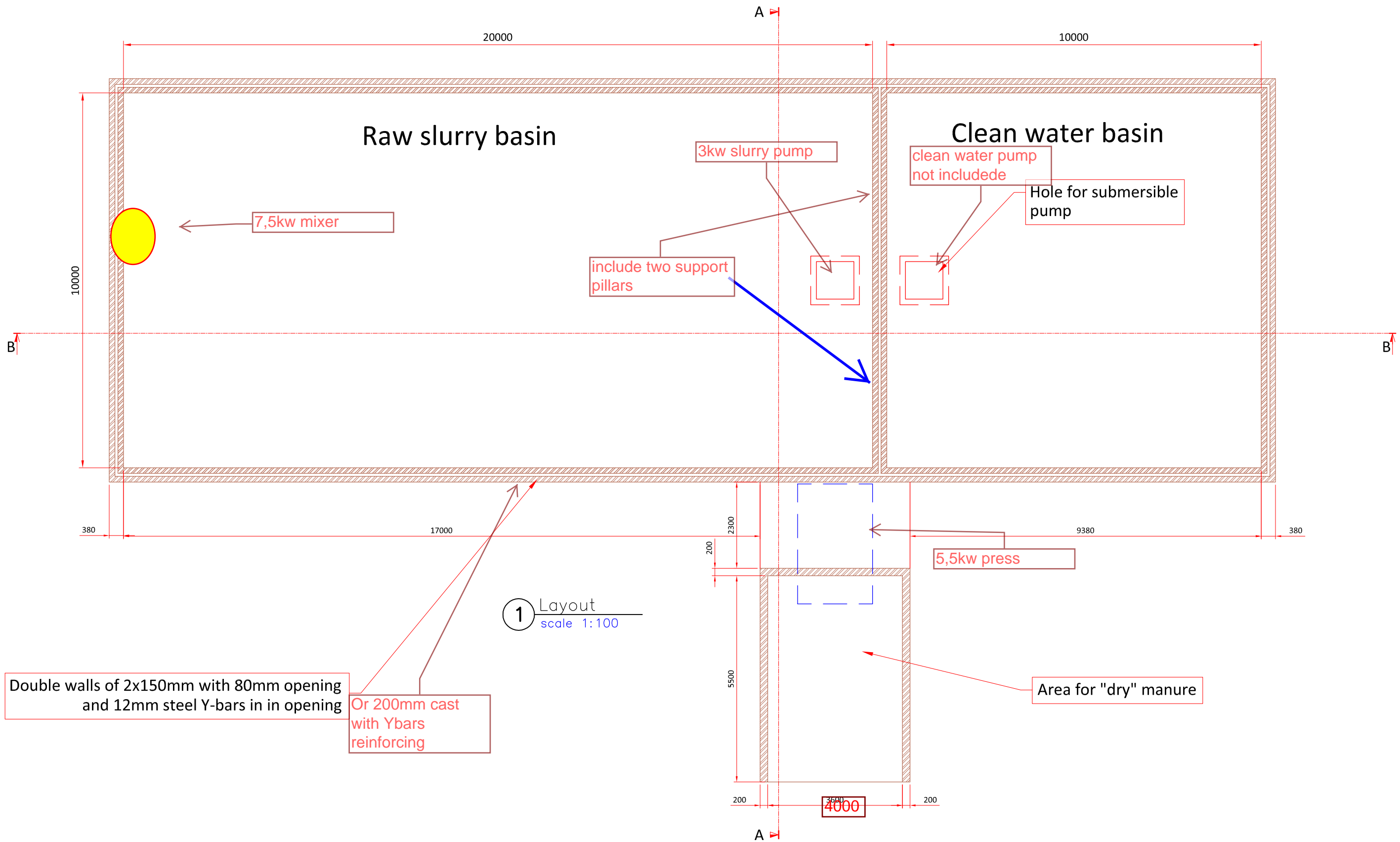
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Scale: <input checked="" type="checkbox"/>	Sign: JNE	Date: 010616									
Checked by:											
		388-3452									



Project size: 4800 sows
Manure storage / treatment

Layout
Manure storage / treatment

(mm) scale: 1:~
(y-m-d) date: 2016-07-19

drawing: 90a
drawn: Joost

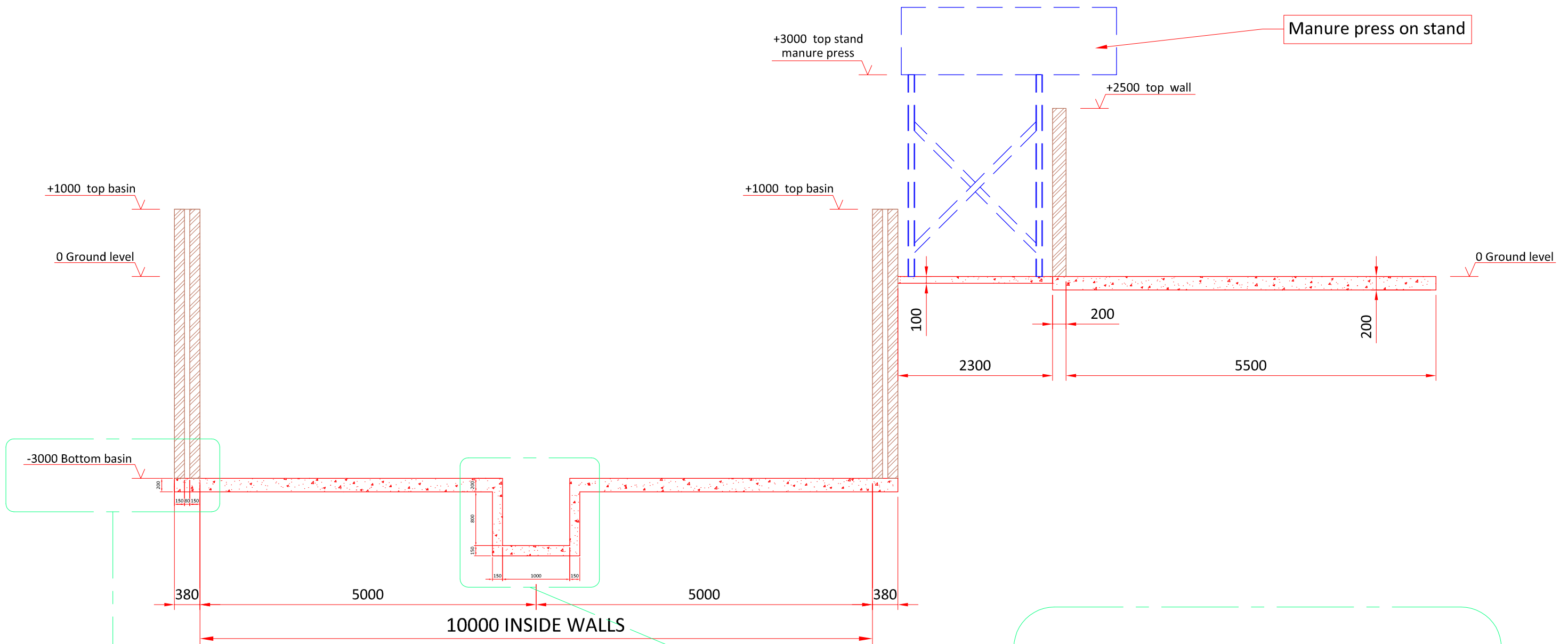
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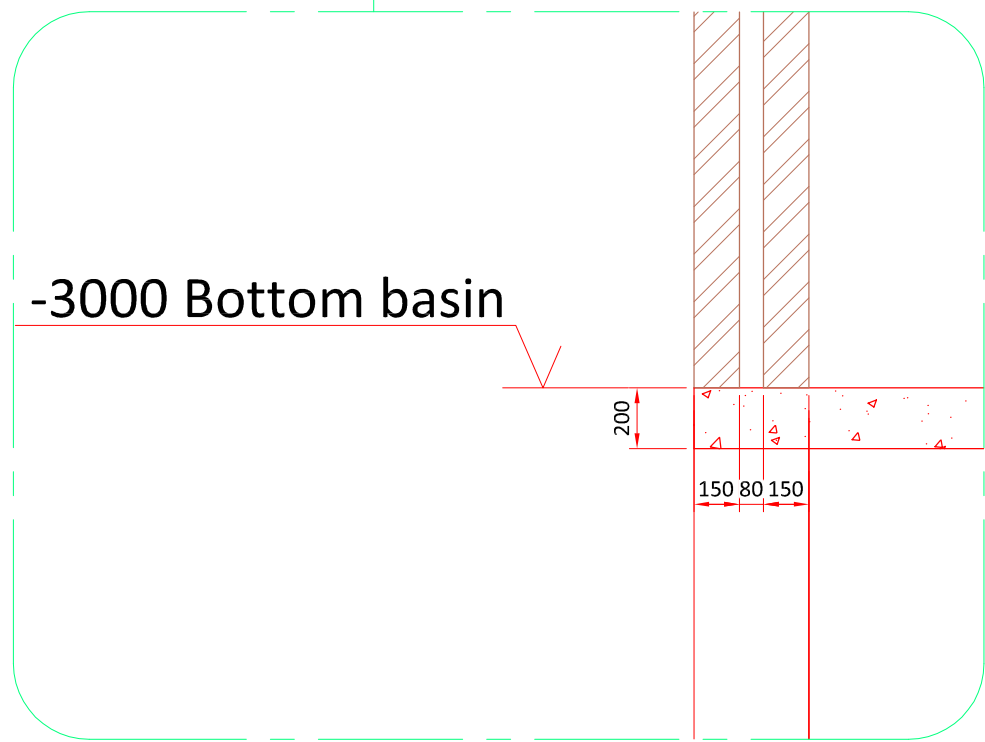
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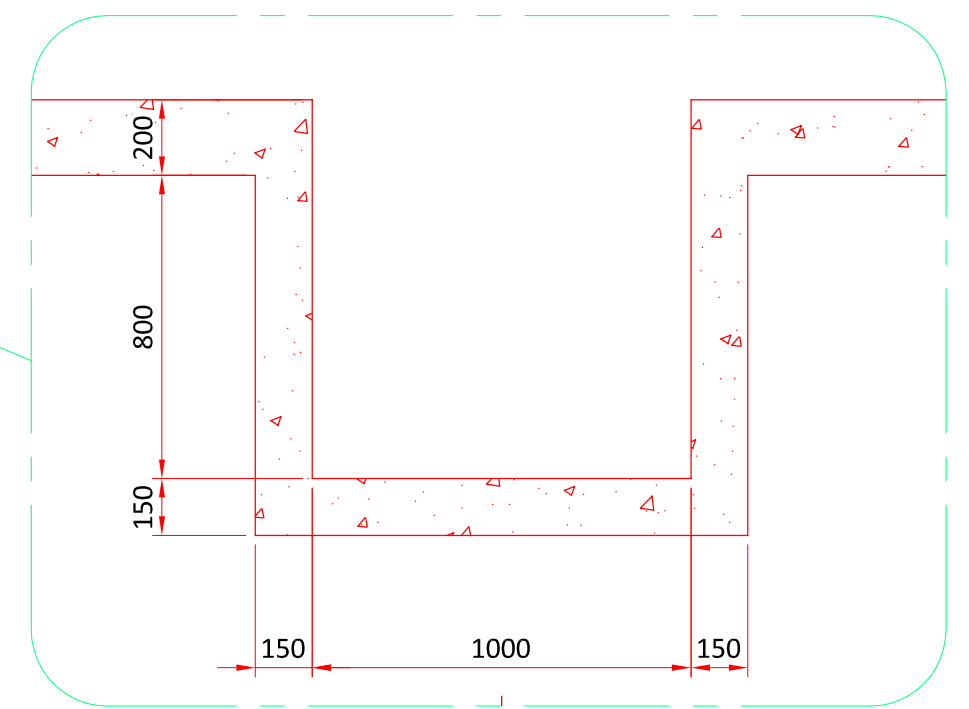
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1 View A-A
scale 1:60



2 Detail
scale 1:25



3 Detail
scale 1:20

Project size: 4800 sows
Manure storage / treatment

View A-A
Manure storage / treatment

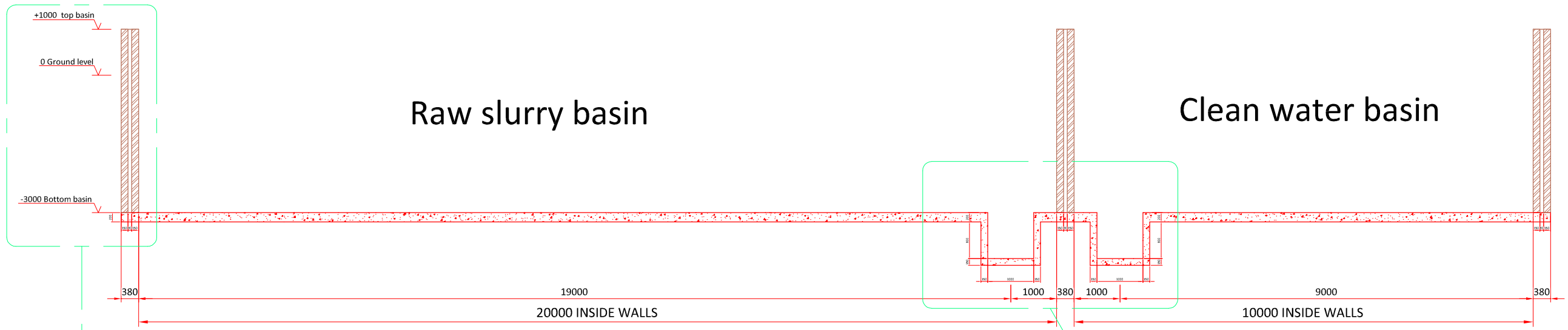
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drawing: 91
drawn: Joost

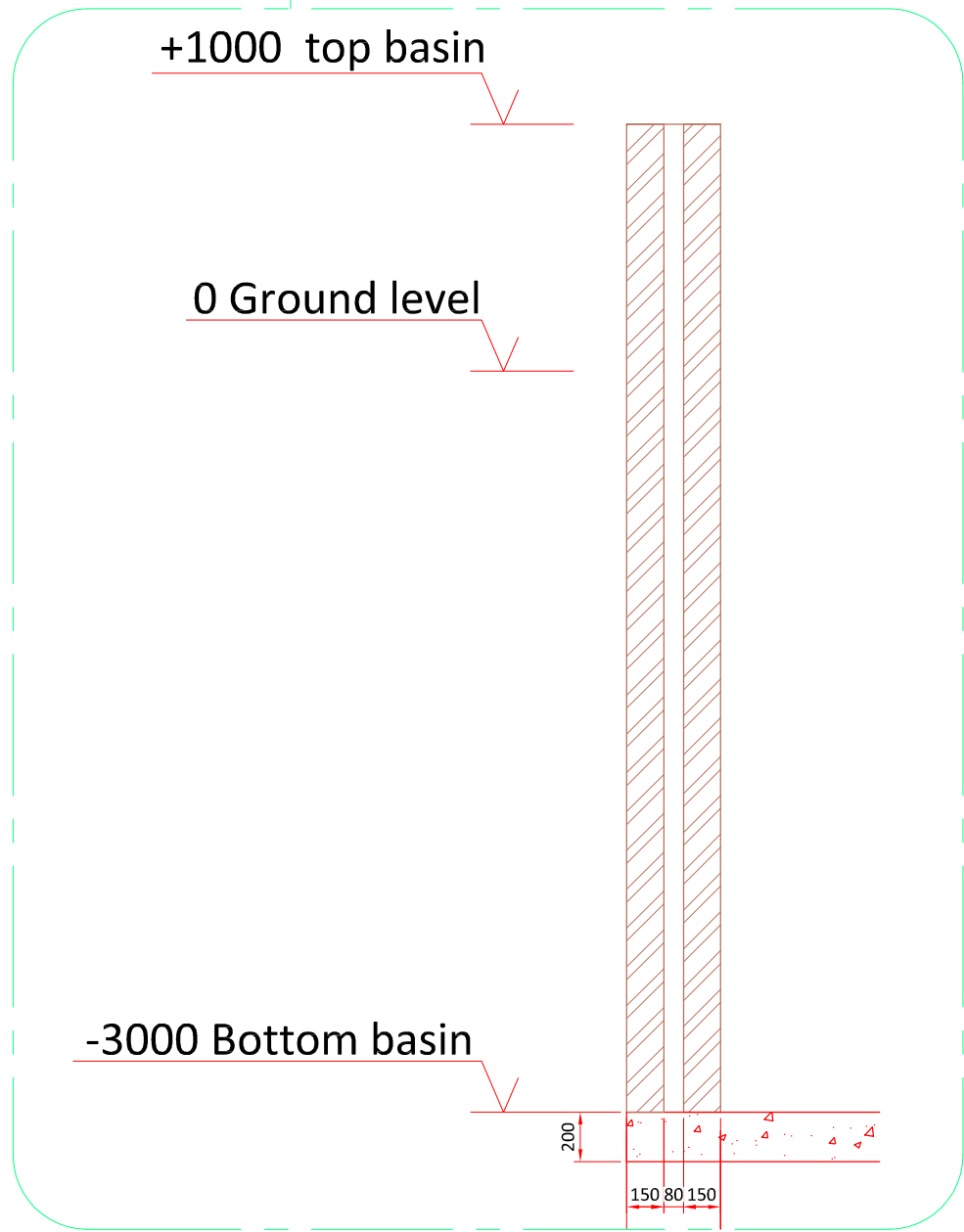
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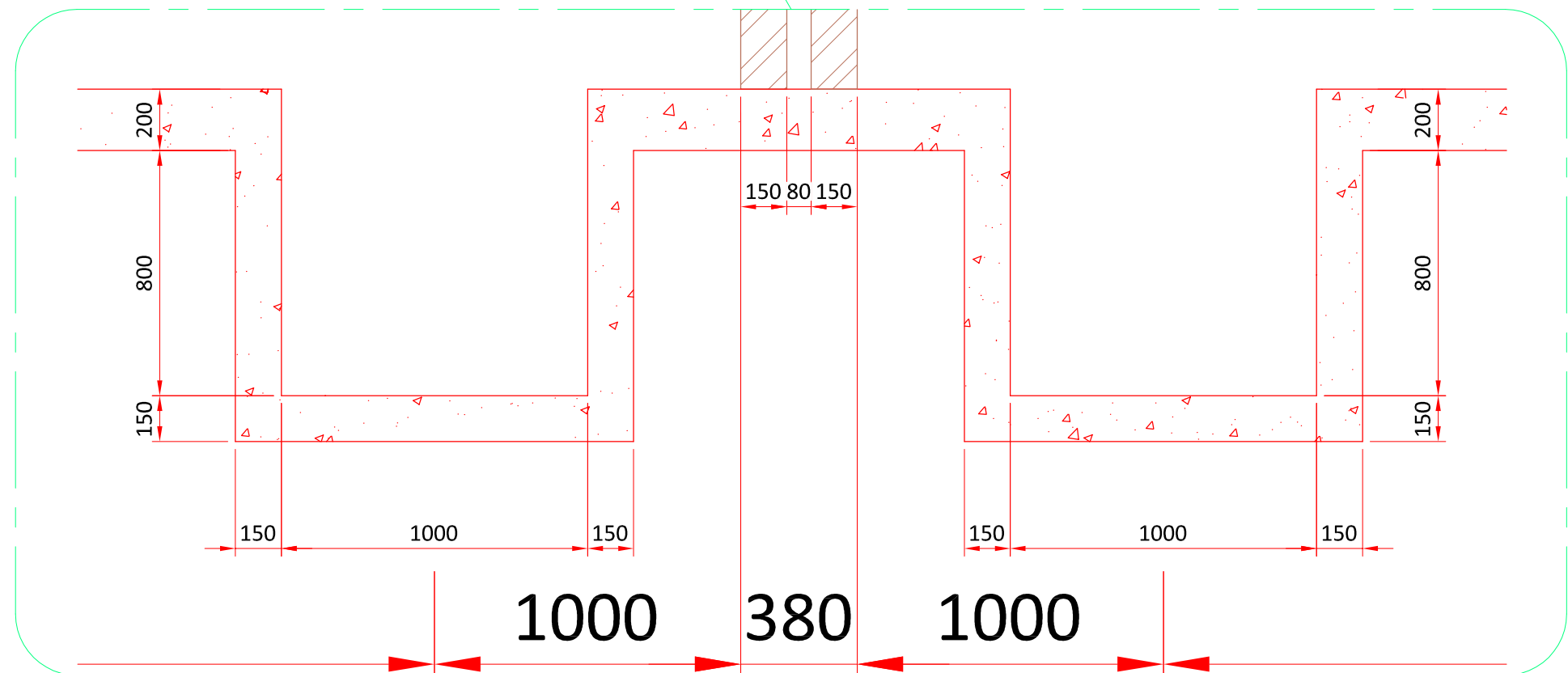
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1 View B-B
scale 1:100



2 Detail
scale 1:30



3 Detail
scale 1:20

Project size: 4800 sows
Manure storage / treatment

View B-B
Manure storage / treatment

(mm) scale: 1:~
(y-m-d) date: 2016-07-19

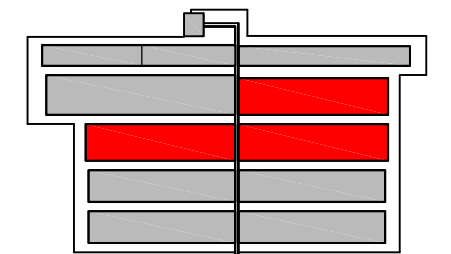
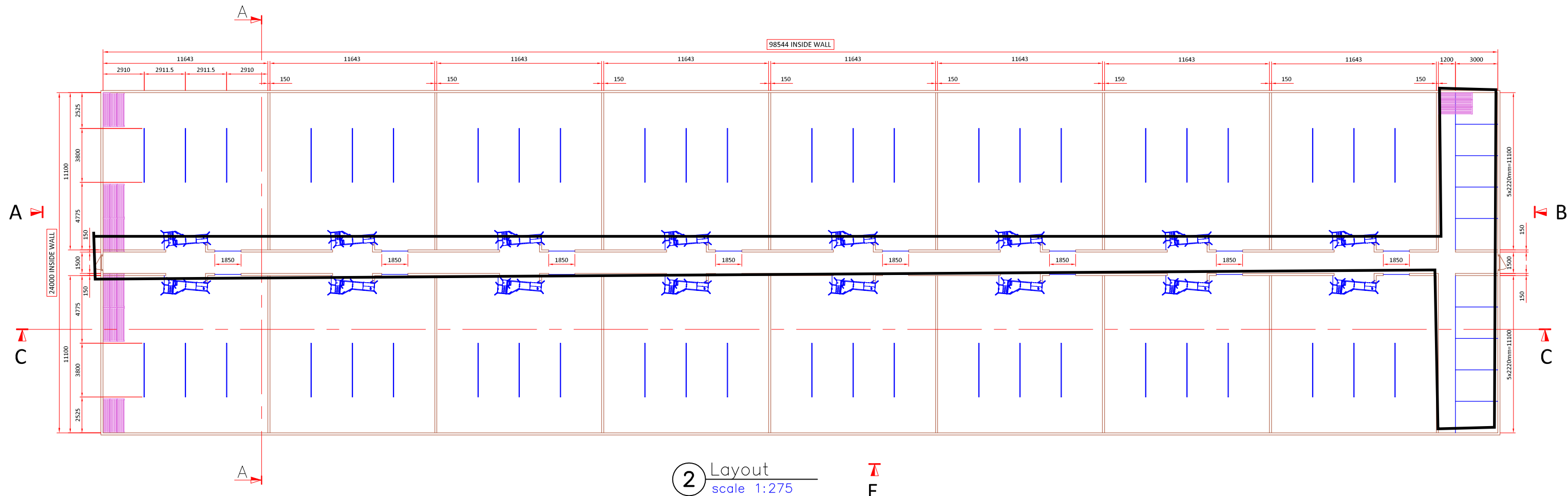
drawing: 92
drawn: Joost

A3



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1 Overview Site 1
scale 1:~

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

Layout
Gestation

(mm) scale: 1:~
 (y-m-d) date: 2016-07-04

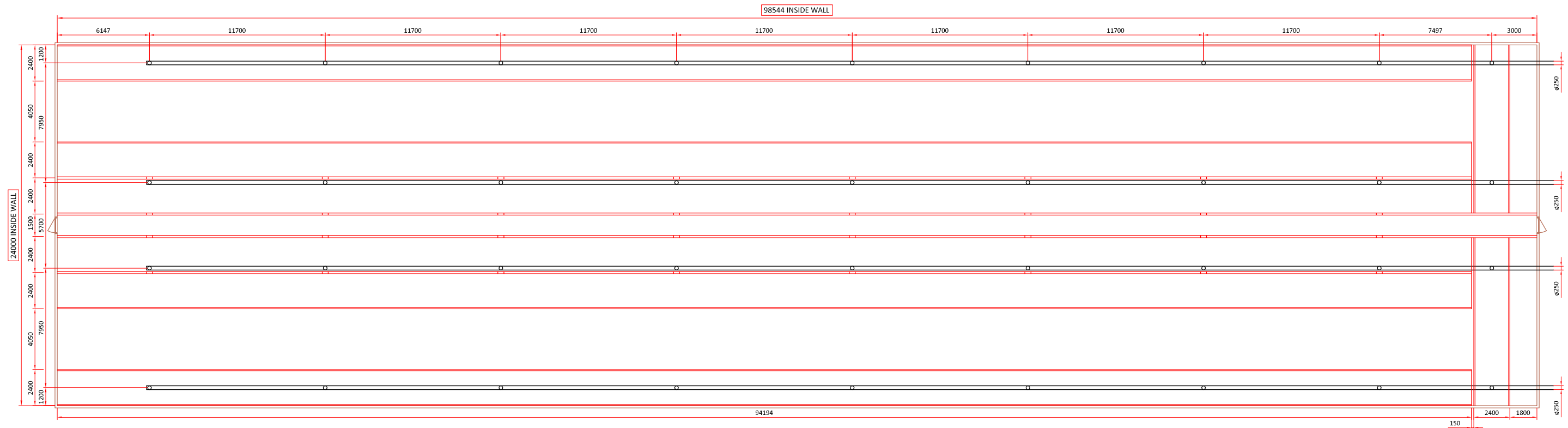
drawing: 40a
 drawn: Joost

A3



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② Slurry
scale 1:275

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

Slurry Gestation

(mm) scale: 1:~
 (y-m-d) date: 2016-06-30

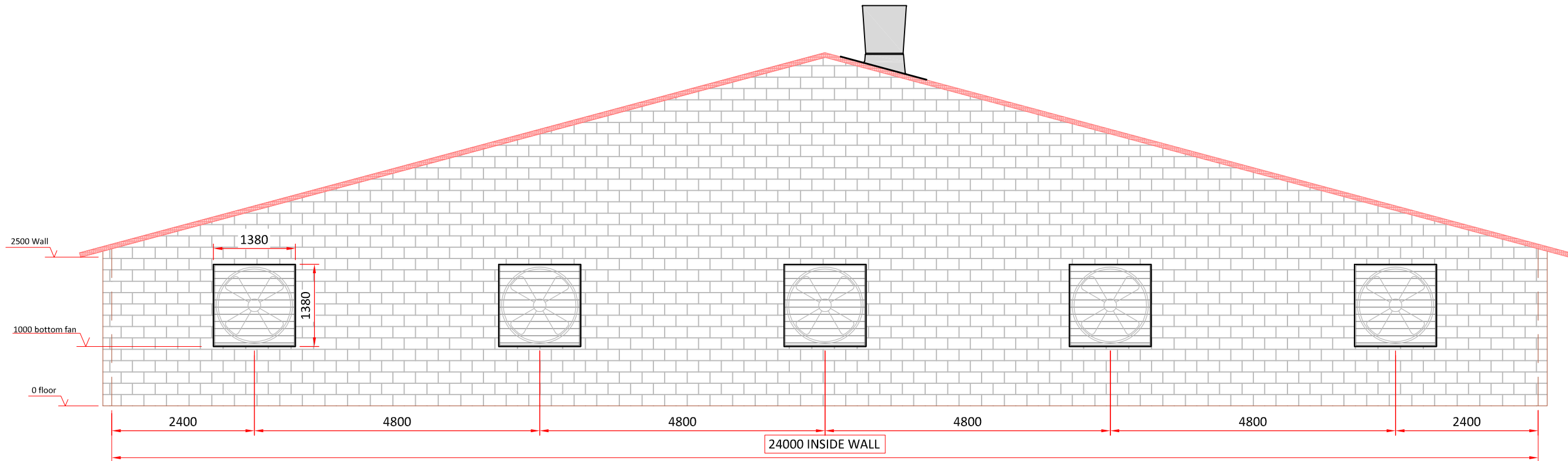
drawing: 40b
 drawn: Joost

A3

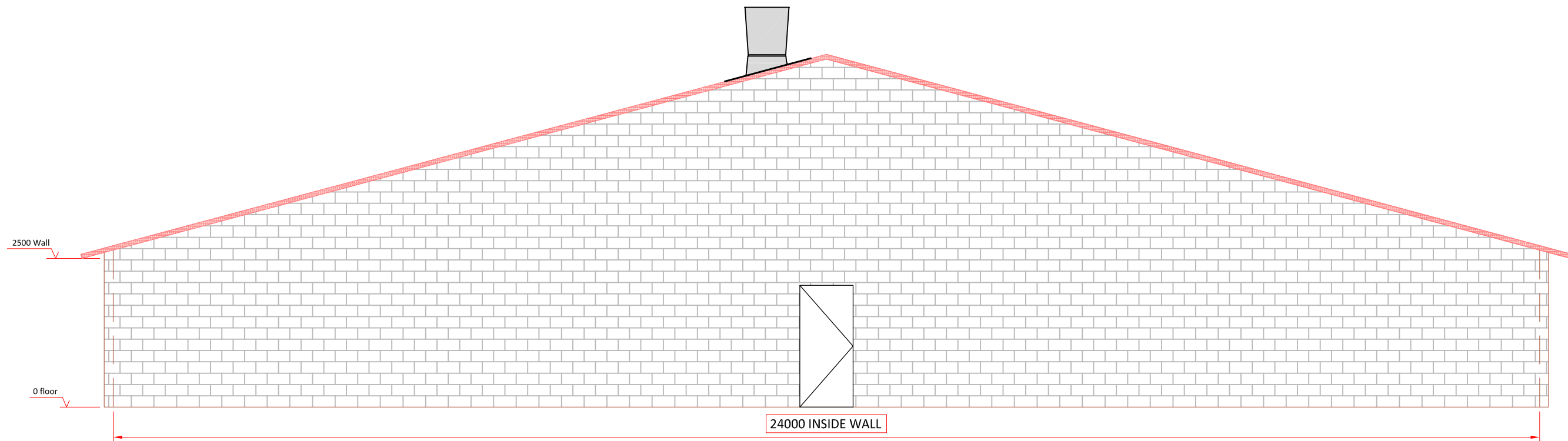


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1 View A
scale 1:75



2 VIEW B
scale 1:75

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

View A and B
 Gestation

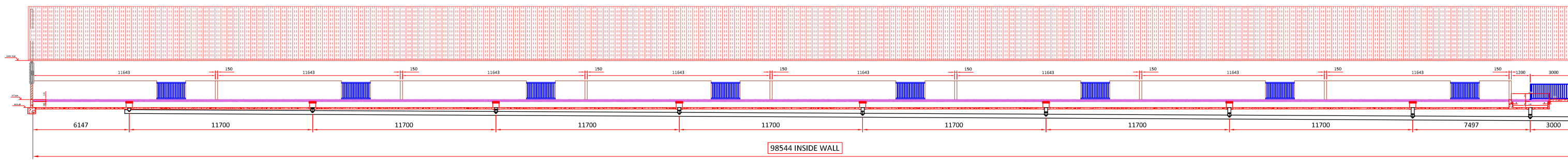
(mm) scale: 1:~
 (y-m-d) date: 2016-06-09

drawing: 41
 drawn: Joost

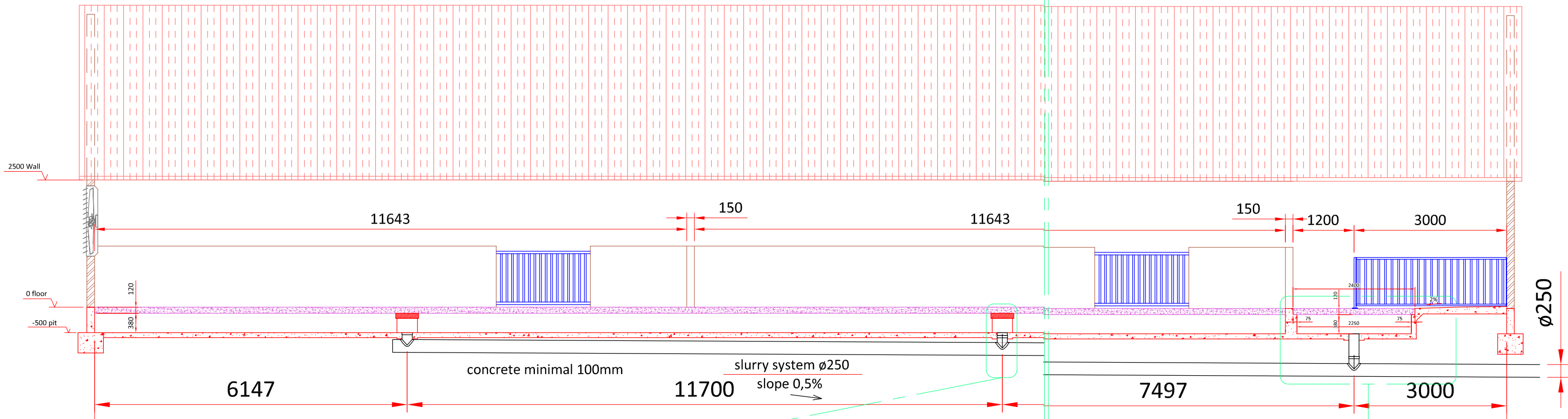
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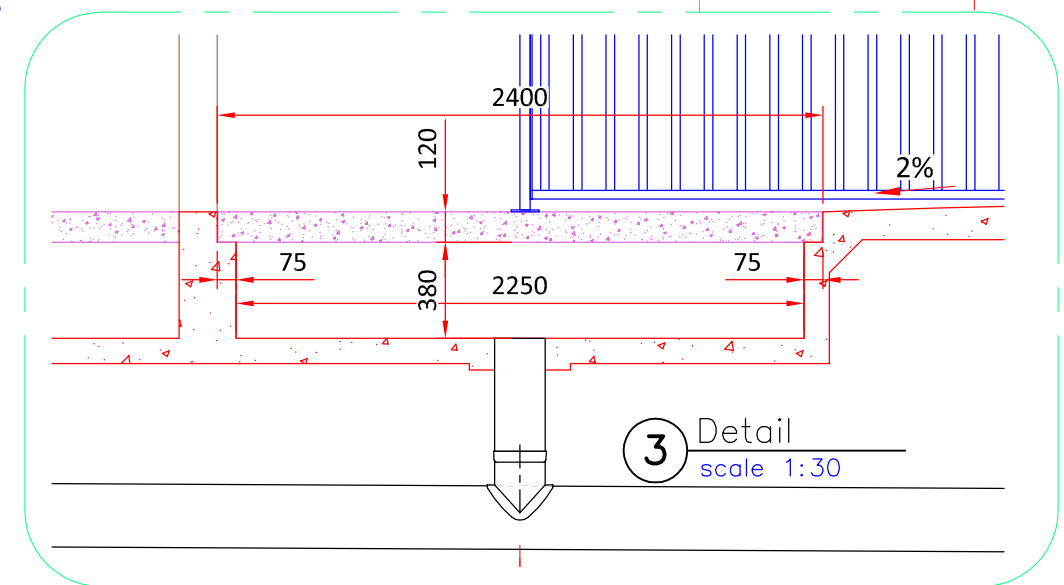
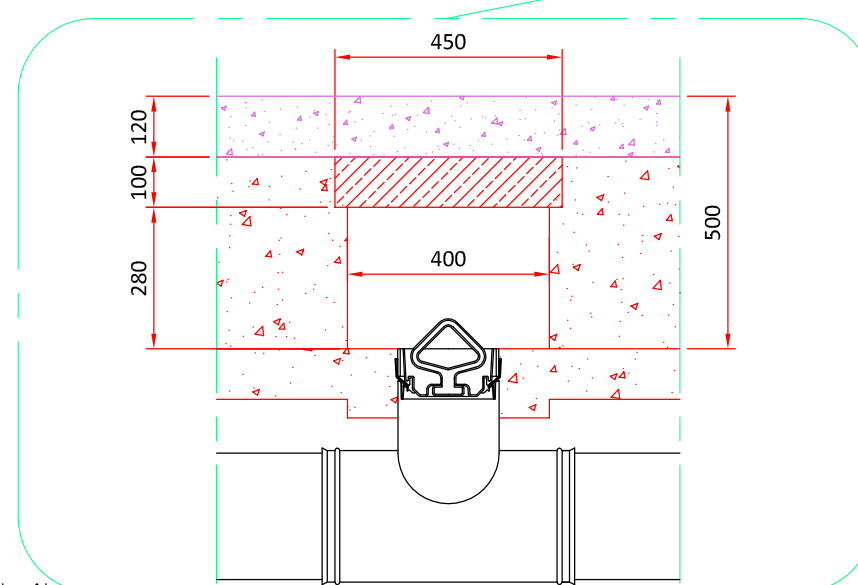
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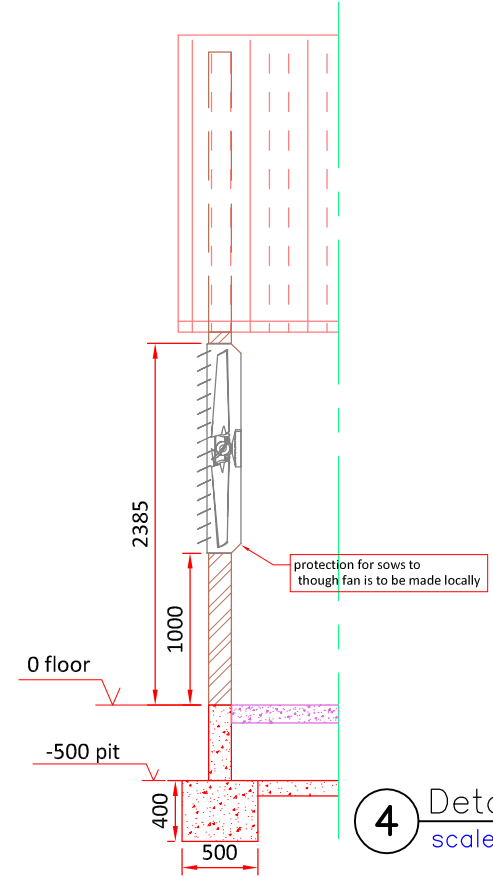
1 View C-C
scale 1:250



2 Detail
scale 1:75



3 Detail
scale 1:30



4 Detail
scale 1:50

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

View C-C
 Gestation

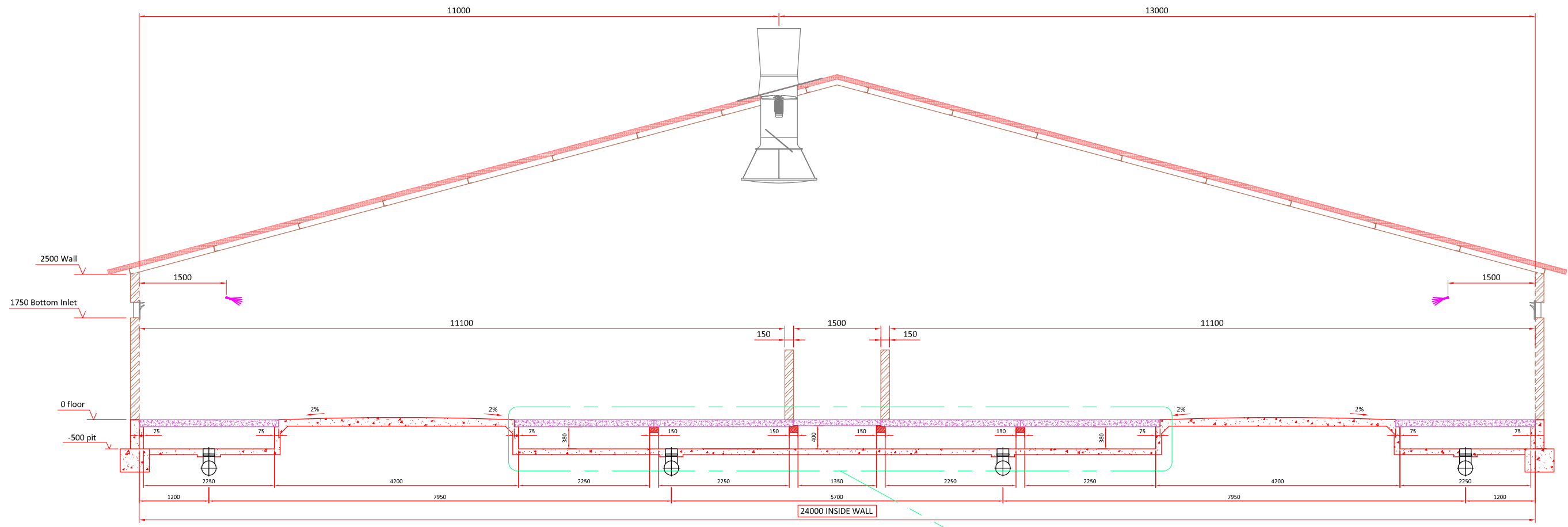
(mm) scale: 1:~
 (y-m-d) date: 2016-06-09

drawing: 42
 drawn: Joost

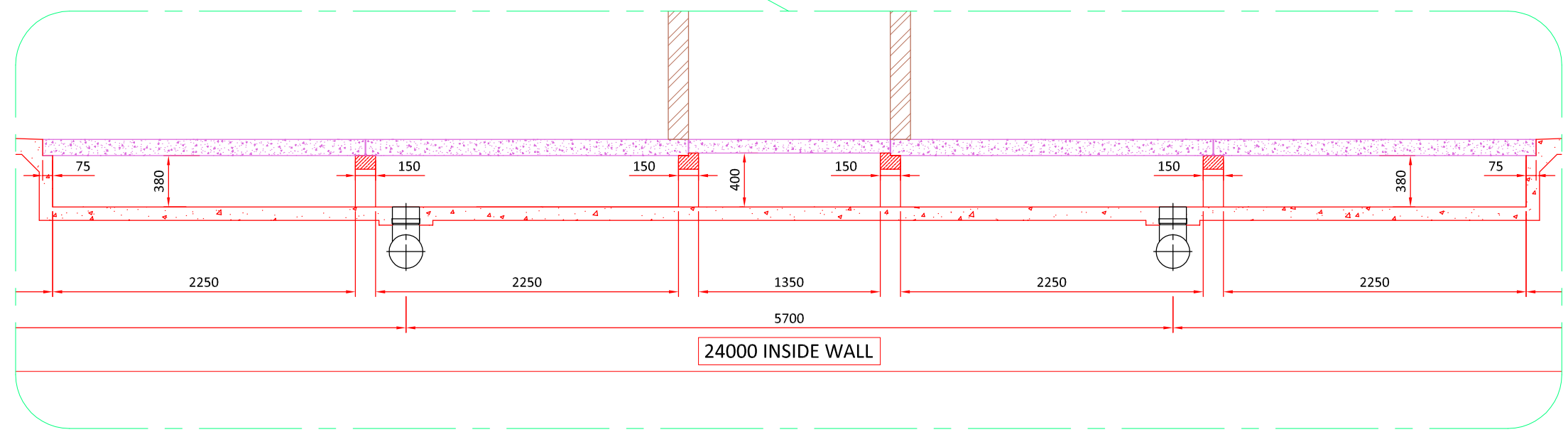
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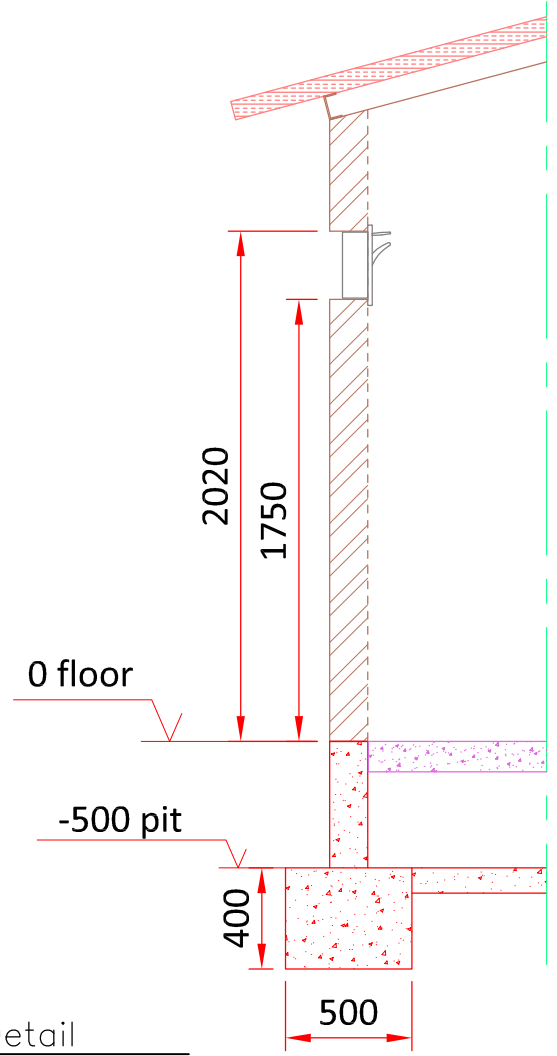
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1 View D-D
scale 1:75



2 Detail
scale 1:40



3 Detail
scale 1:30

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

View D-D
 Gestation

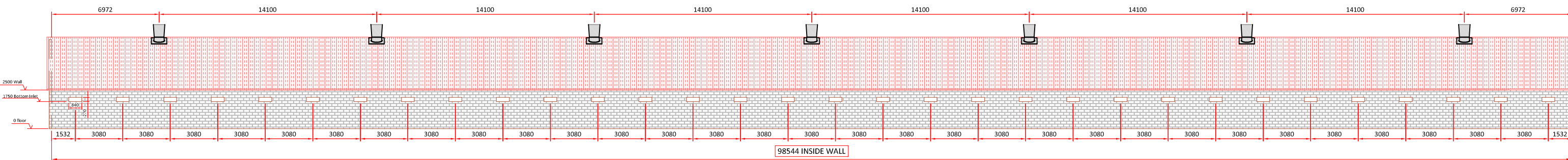
(mm) scale: 1:~
 (y-m-d) date: 2016-07-04

drawing: 43
 drawn: Joost

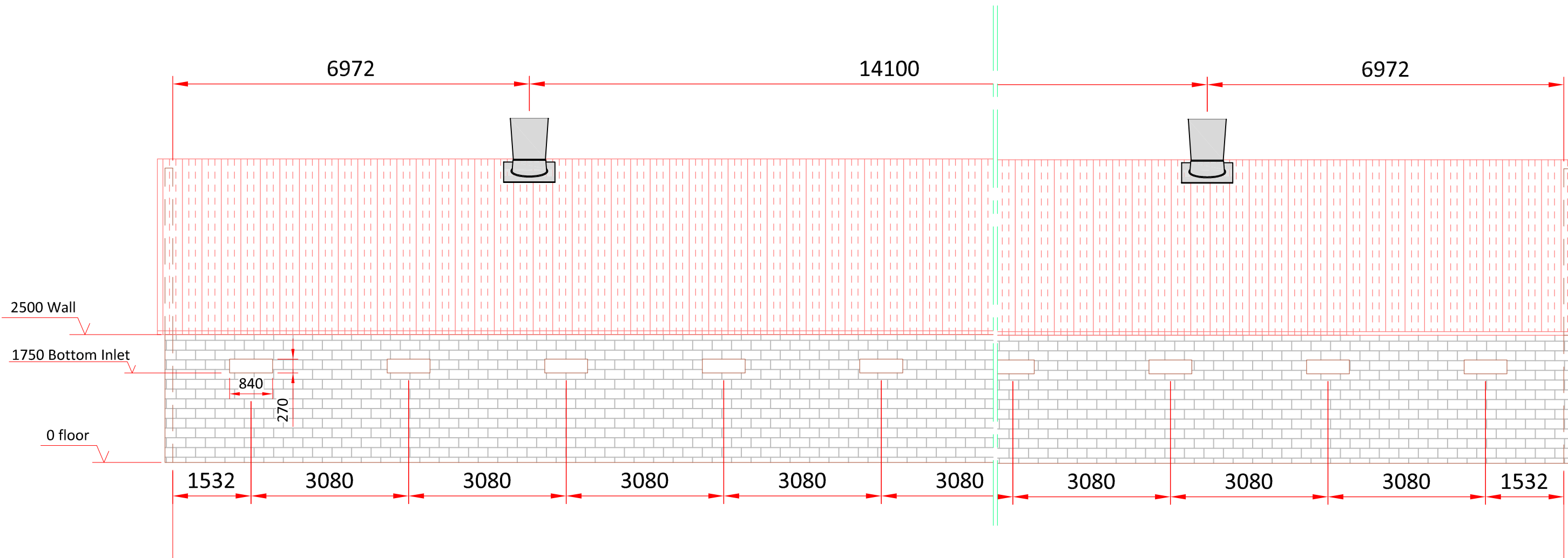
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1 View E
scale 1:250



2 Detail
scale 1:80

Project size: 4800 sows
 3 buildings
 1 room with 2 rows of 8 gestation groups
 2 rows of 5 special care pens
 Total 48 gestation groups and 30 special care pens

View E
 Gestation

(mm) scale: 1:~
 (y-m-d) date: 2016-07-04

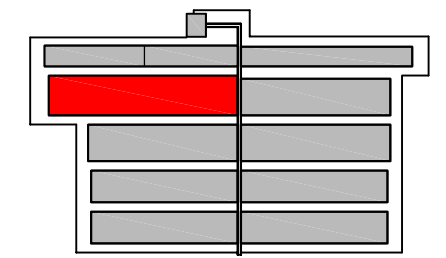
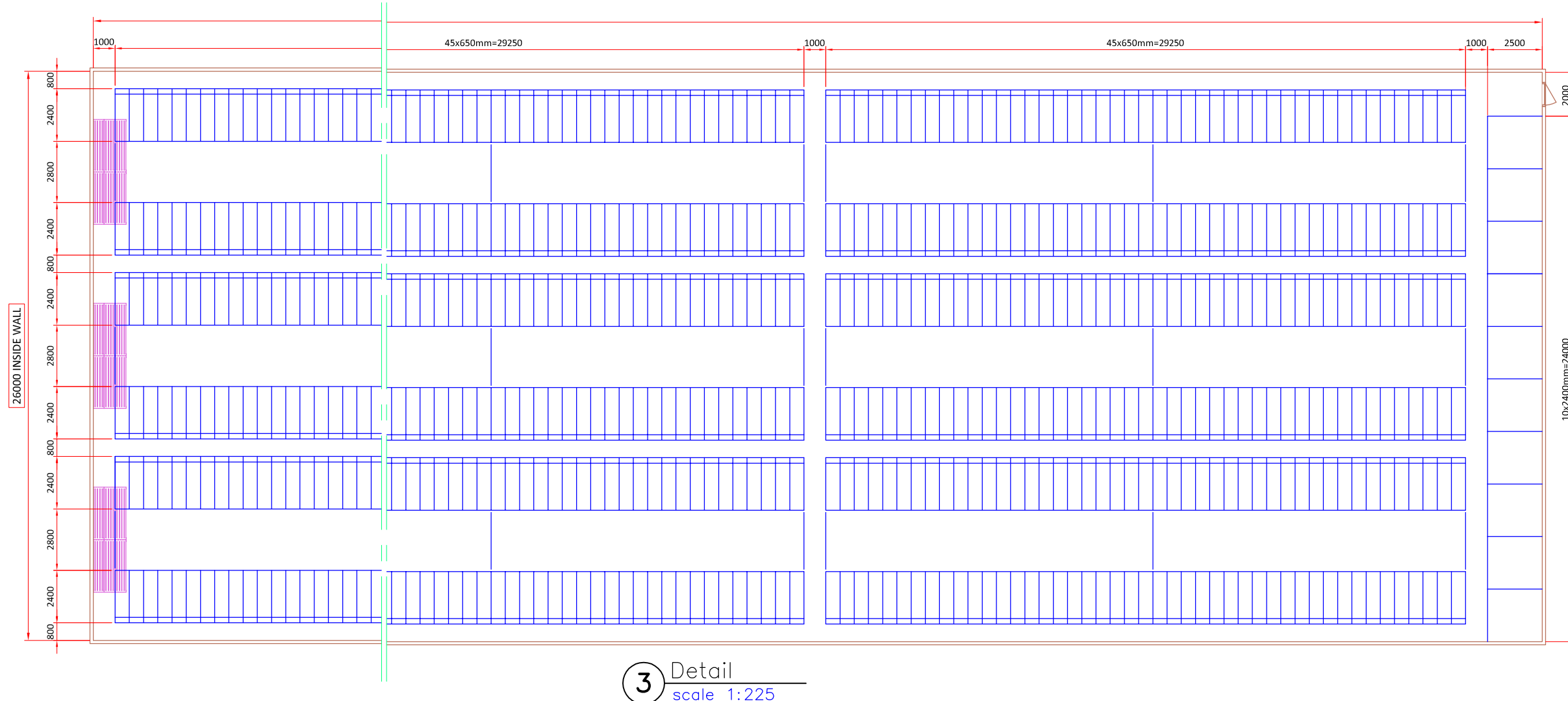
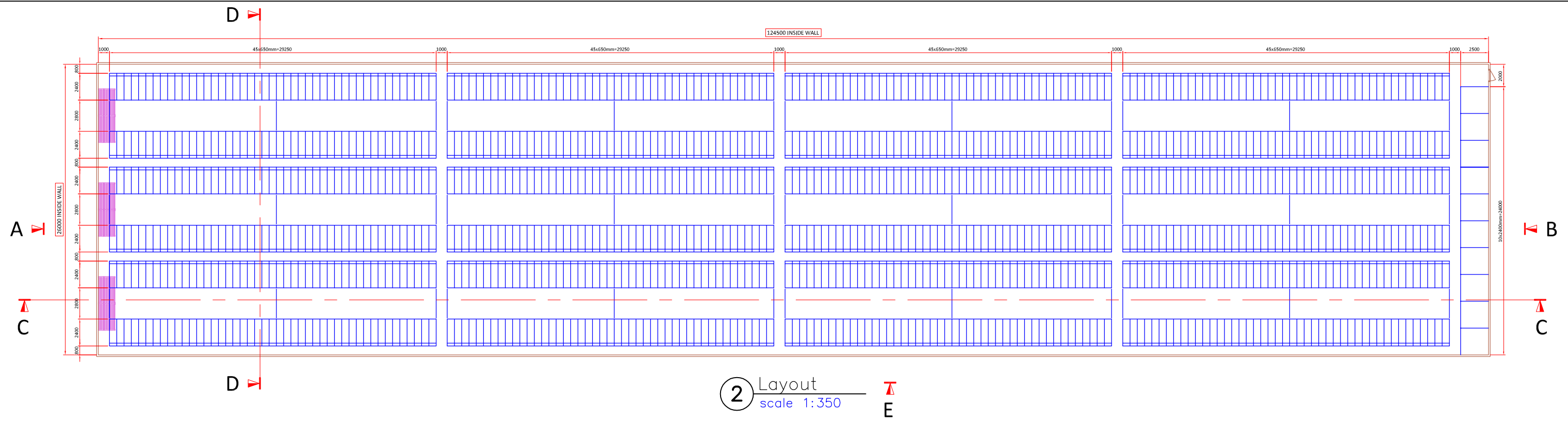
drawing: 44
 drawn: Joost

A3

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Project size: 4800 sows
 1 building
 1 room with 18 rows of 60 stalls
 and 1 row of 10 group pens
 Total 1080 early gestation stalls

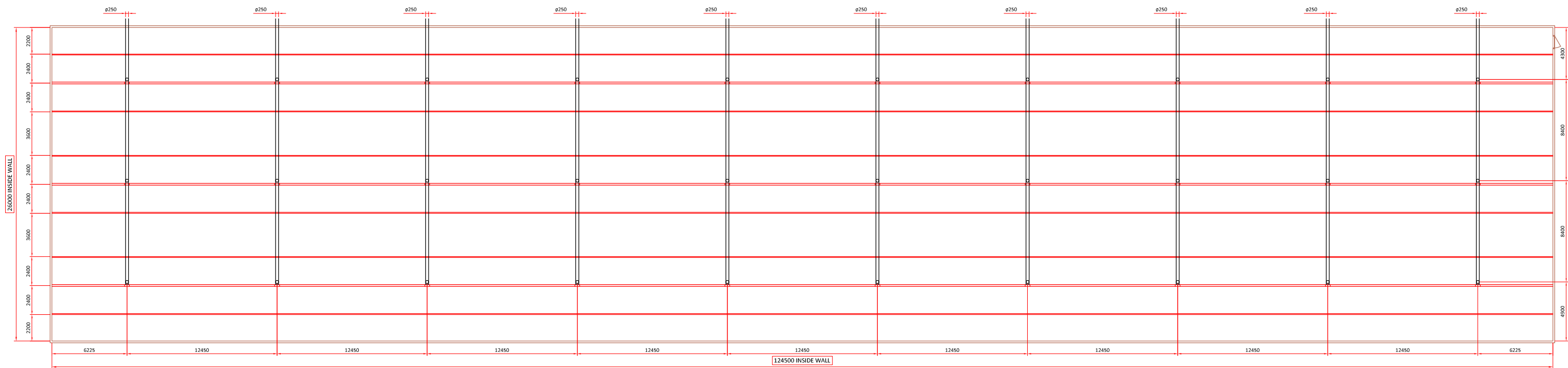
Layout
 Early Gestation

(mm) scale: 1:~ drawing: 30a
 (y-m-d) date: 2016-06-30 drawn: Joost

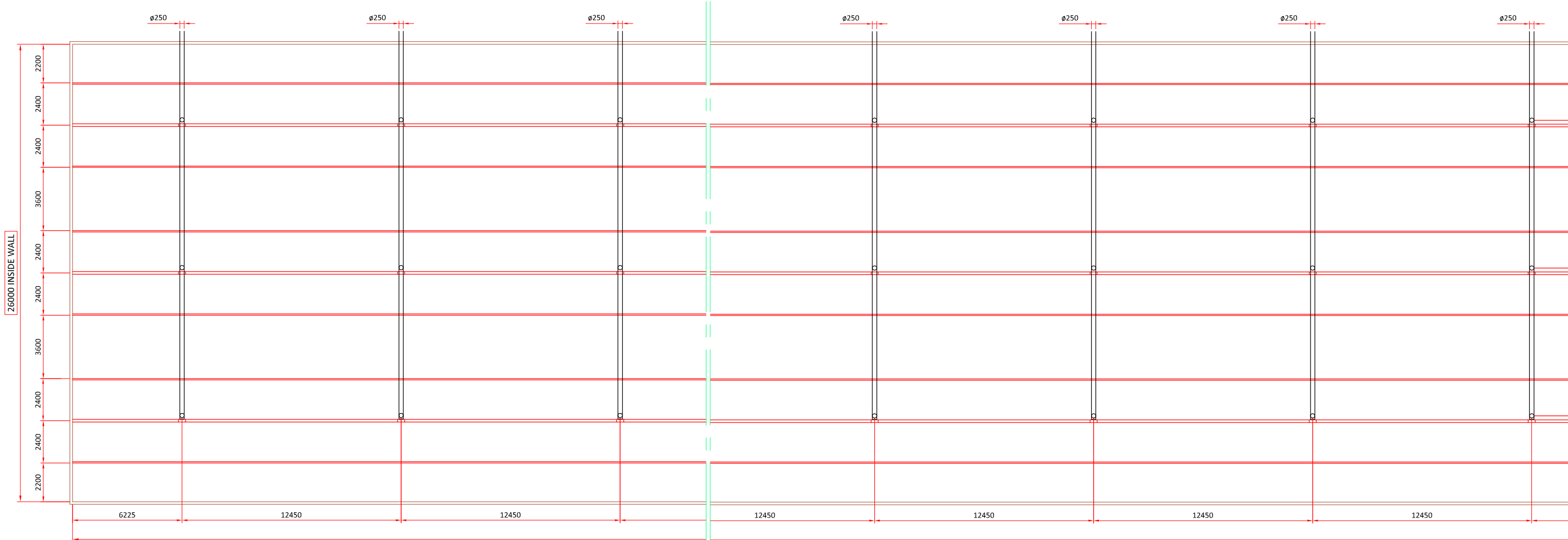
A3

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1 Slurry
scale 1:325



2 Detail
scale 1:225

Project size: 4800 sows
 1 building
 1 room with 24 rows of 45 stalls (650mm c.o.c)
 and 1 row of 10 group pens
 Total 1080 early gestation stalls

Slurry Early Gestation

(mm) scale: 1:~
 (y-m-d) date: 2016-06-30

drawing: 30b
 drawn: Joost

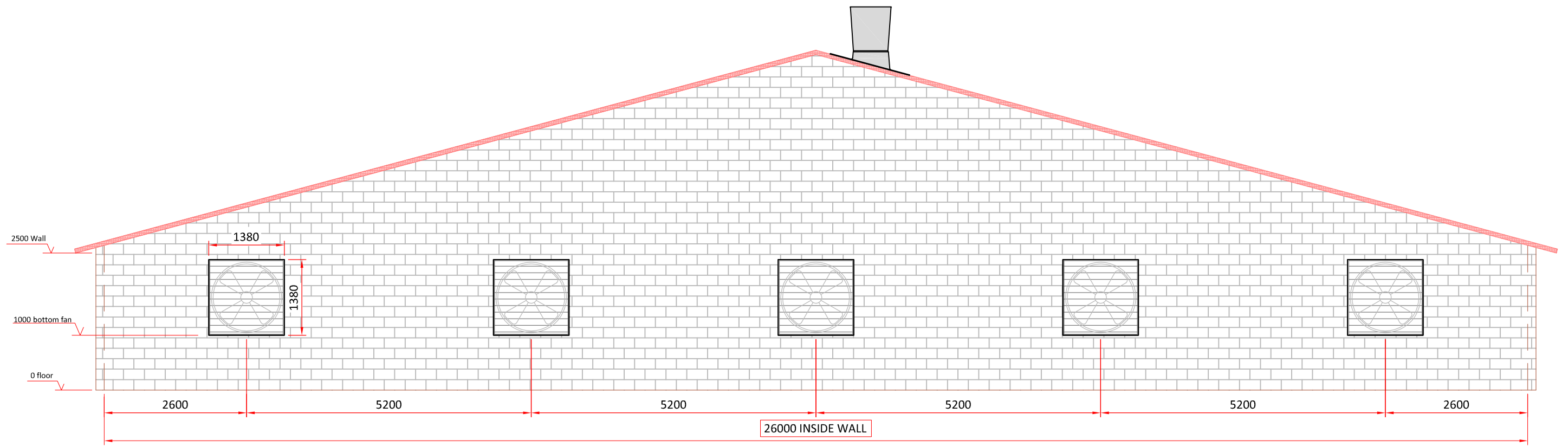
A3

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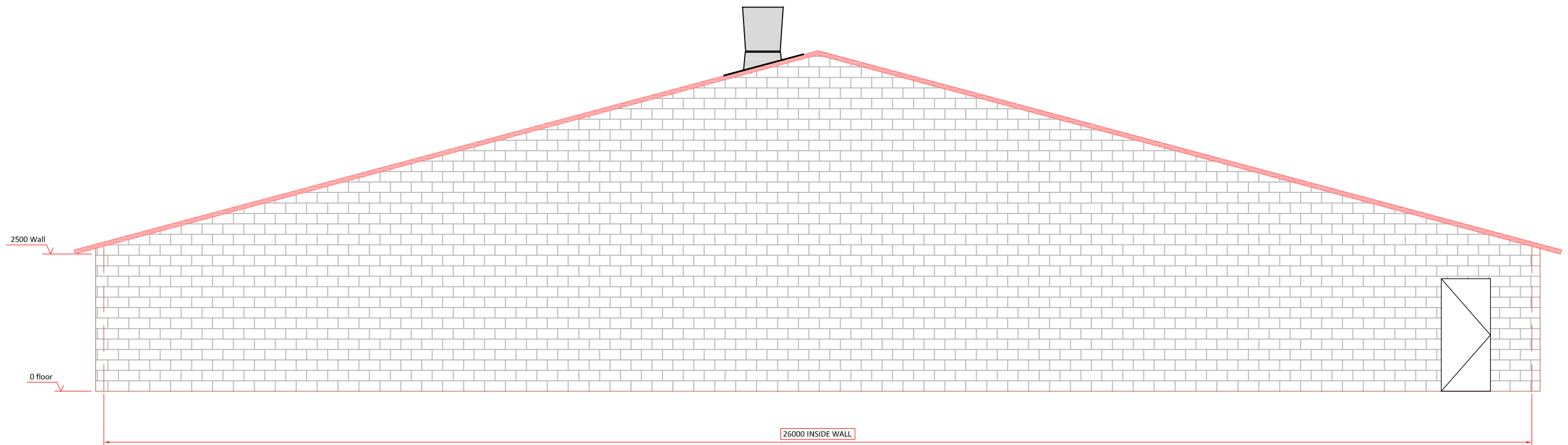
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1 View A
scale 1:75



2 View B
scale 1:75

Project size: 4800 sows
 1 building
 1 room with 24 rows of 45 stalls (650mm c.o.c)
 and 1 row of 10 group pens
 Total 1080 early gestation stalls

View A and B
Early Gestation

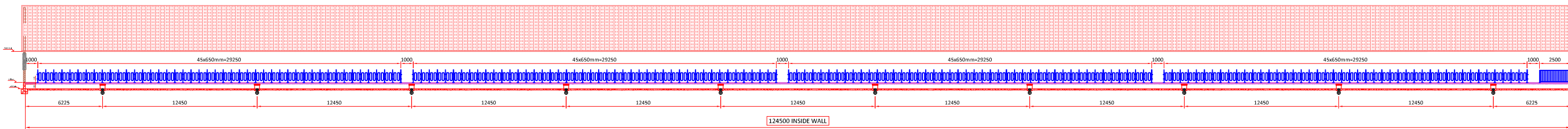
(mm) scale: 1:~
 (y-m-d) date: 2016-06-06

drawing: 31
 drawn: Joost

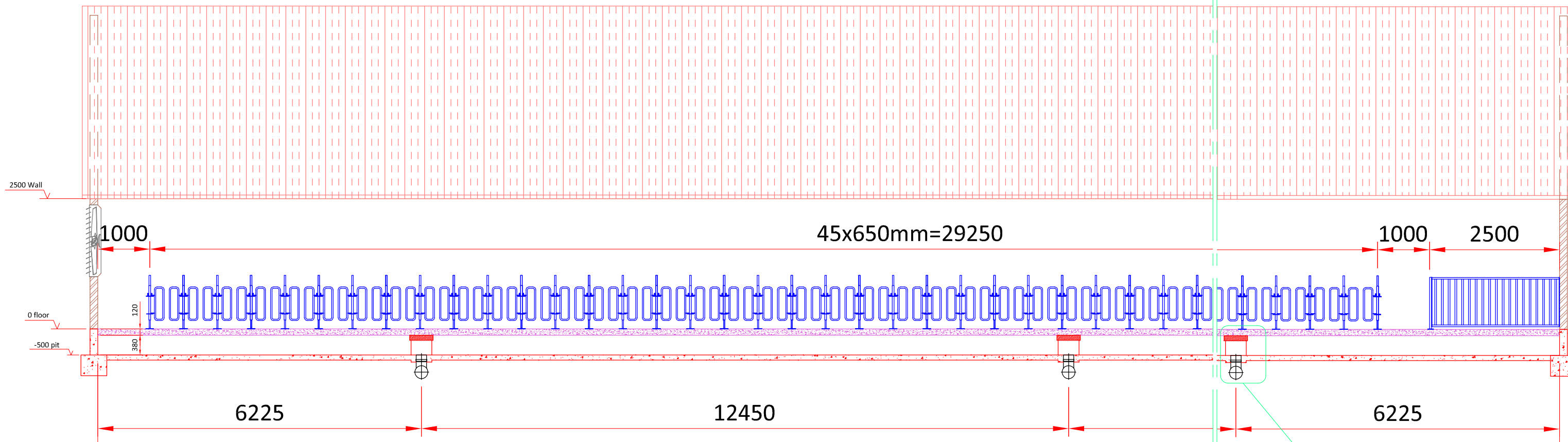
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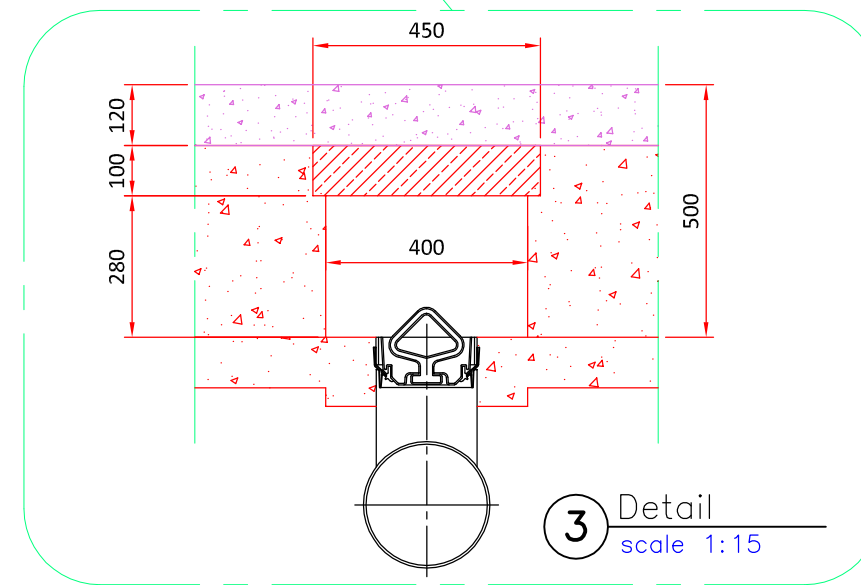
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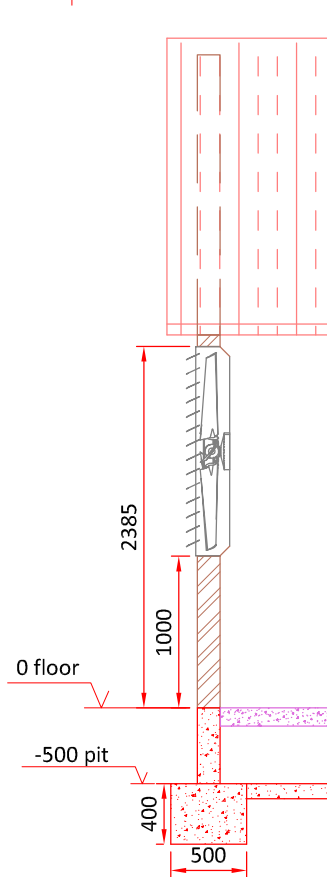
1 View C-C
scale 1:325



2 Detail
scale 1:75



3 Detail
scale 1:15



4 Detail
scale 1:50

Project size: 4800 sows
1 building
1 room with 24 rows of 45 stalls (650mm c.o.c)
and 1 row of 10 group pens
Total 1080 early gestation stalls

View C-C
Early Gestation

(mm) scale: 1:~
(y-m-d) date: 2016-06-30

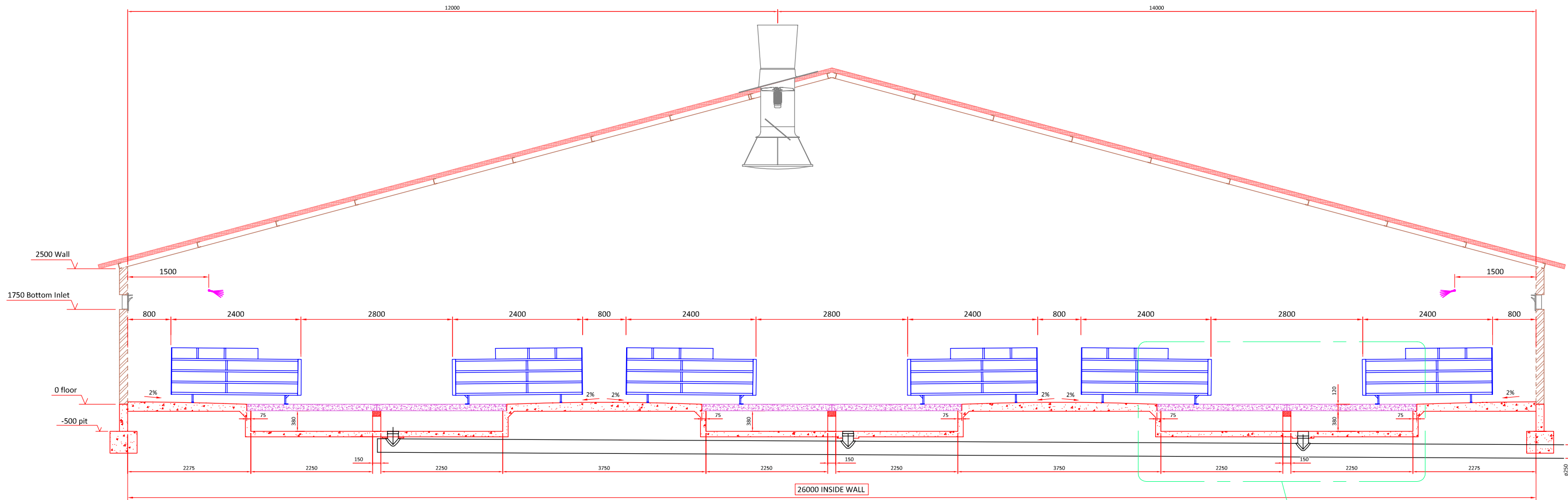
drawing: 32
drawn: Joost

A3

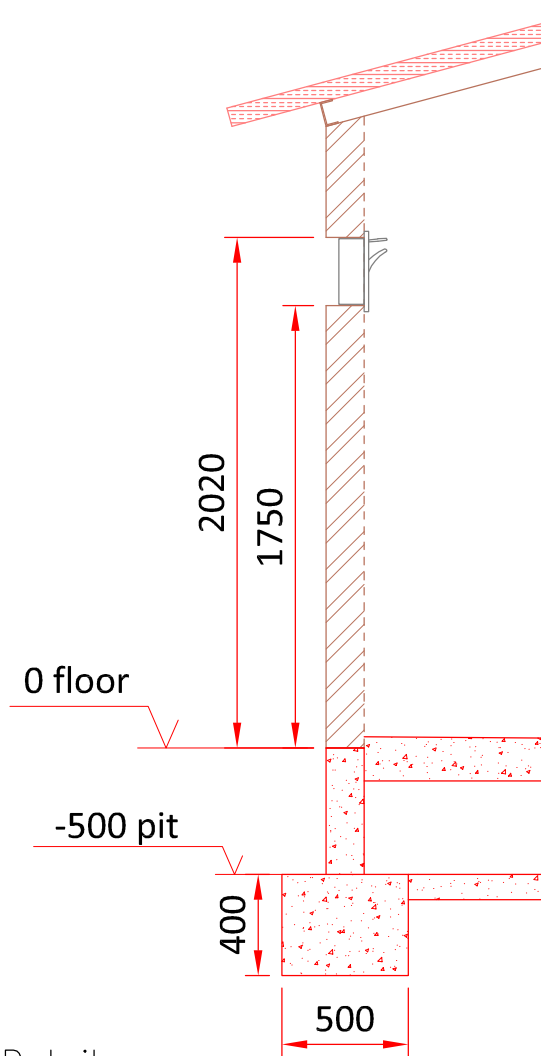
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feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

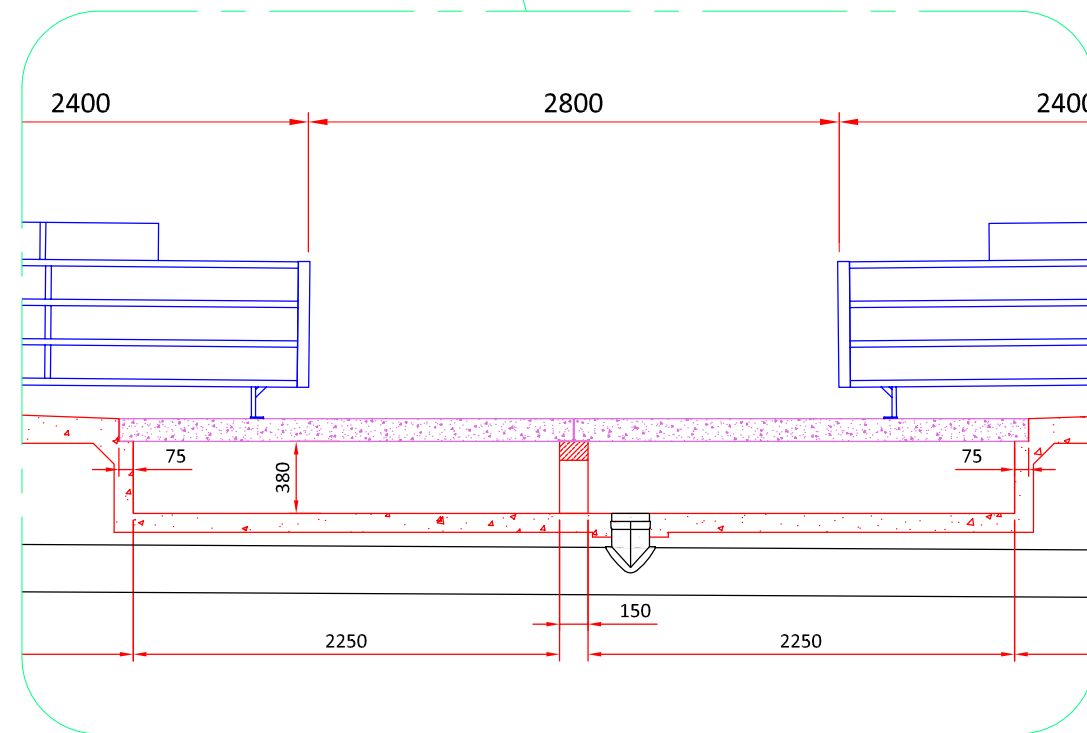
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1 View D-D
scale 1:75



3 Detail
scale 1:30



concrete minimal 100mm

2 Detail
scale 1:40

slurry system $\phi 250$
slope 0,5%

Project size: 4800 sows
1 building
1 room with 24 rows of 45 stalls (650mm c.o.c)
and 1 row of 10 group pens
Total 1080 early gestation stalls

View D-D
Early Gestation

(mm) scale: 1:~
(y-m-d) date: 2016-06-09

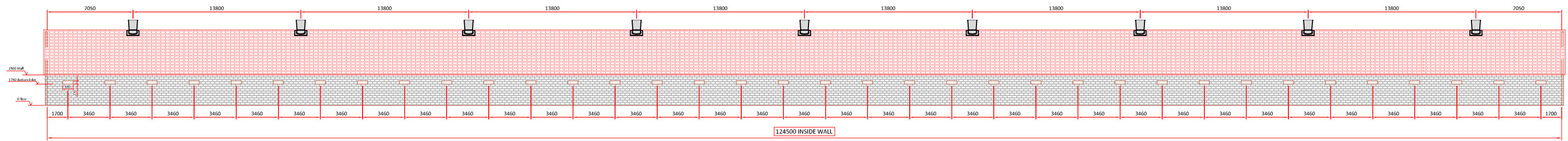
drawing: 33
drawn: Joost

A3

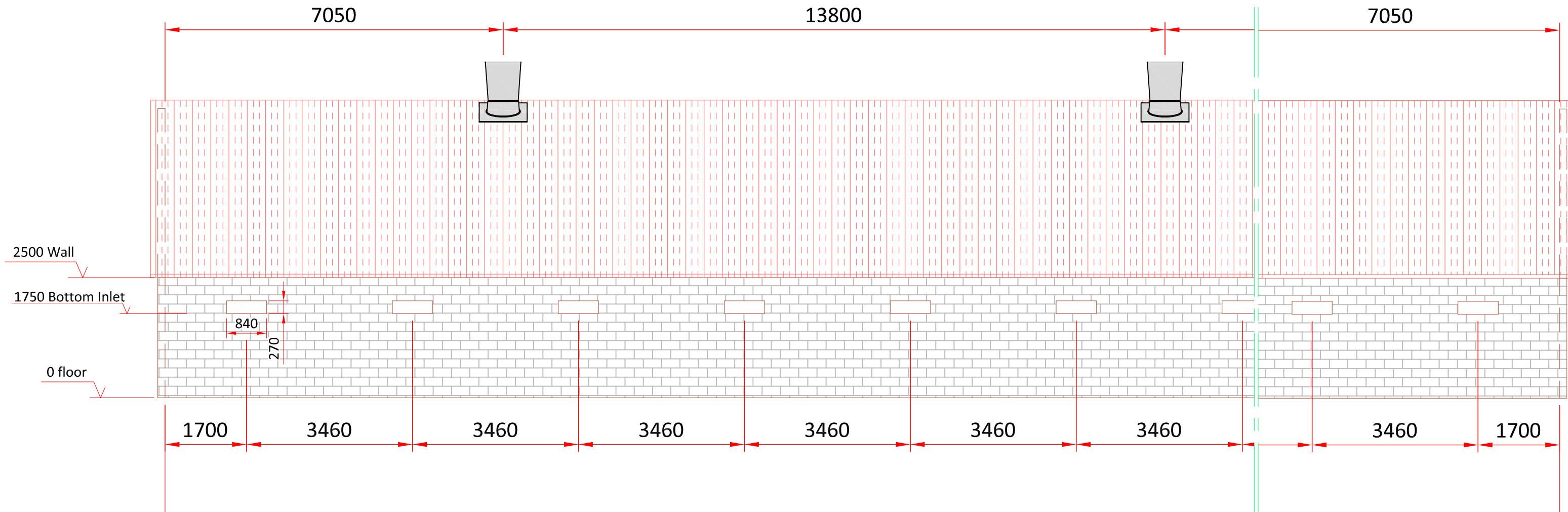
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1 View C-C
scale 1:325



2 Detail
scale 1:80

Project size: 4800 sows
 1 building
 1 room with 24 rows of 45 stalls (650mm c.o.c)
 and 1 row of 10 group pens
 Total 1080 early gestation stalls

View E
Early Gestation

(mm) scale: 1:~
 (y-m-d) date: 2016-06-30

drawing: 34
 drawn: Joost

A3

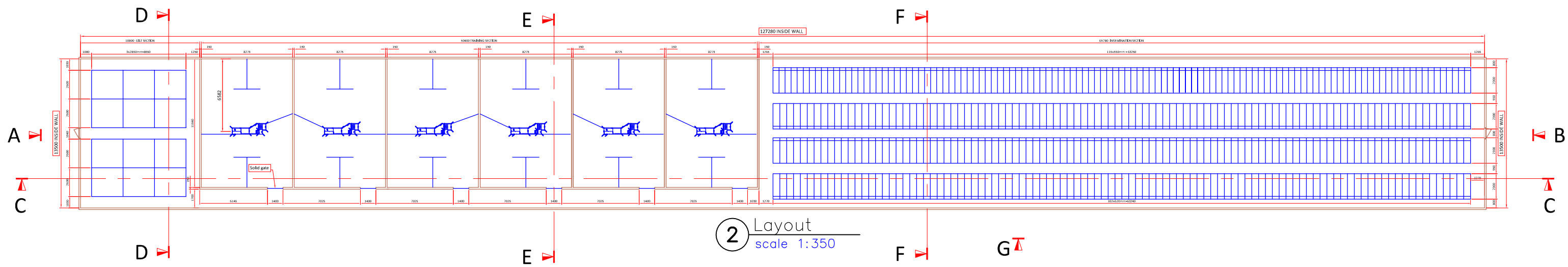
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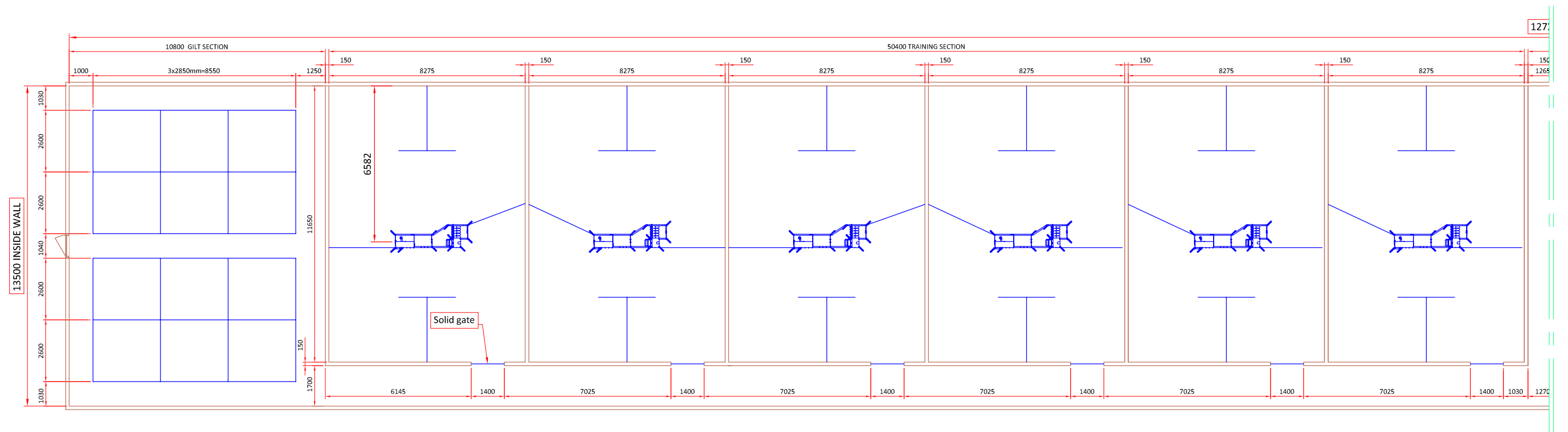
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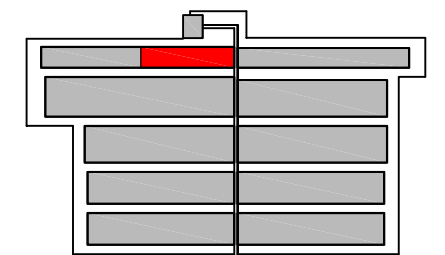
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2 Layout
scale 1:350



3 Detail Gilt + Training section
scale 1:175



1 Overview Site 1
scale 1:~

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

Layout
 Insemination - Heat detection and training

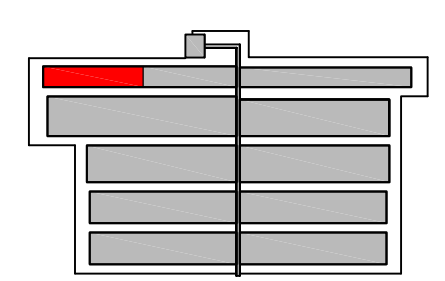
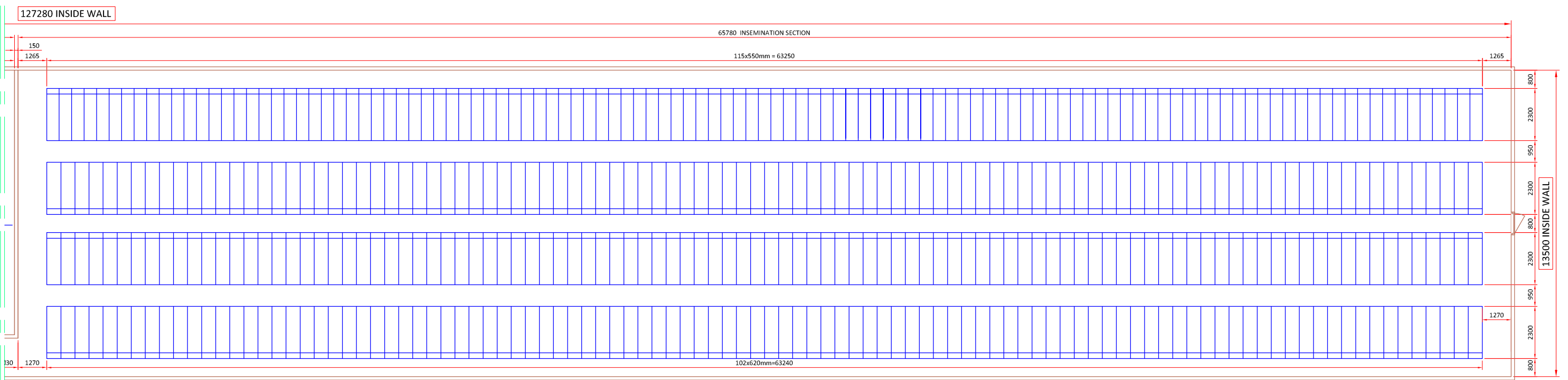
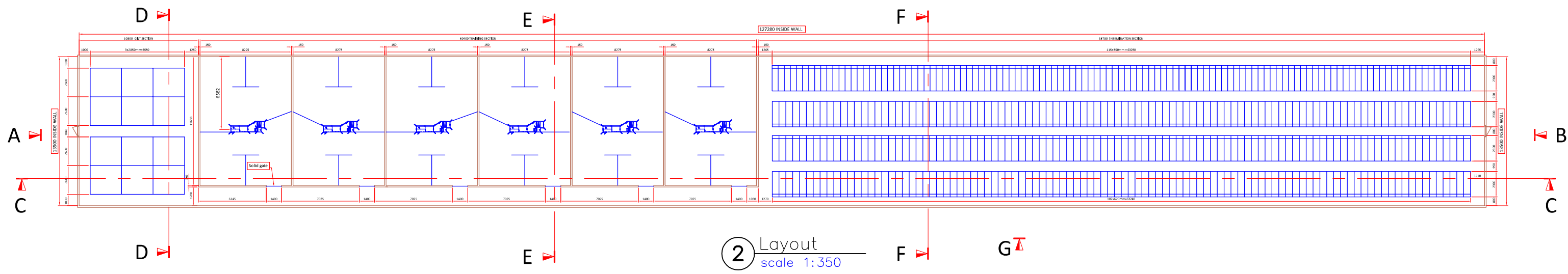
(mm) scale: 1:~
 (y-m-d) date: 2016-05-24

drawing: 20a
 drawn: Joost

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1 Overview Site 1
scale 1:~

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

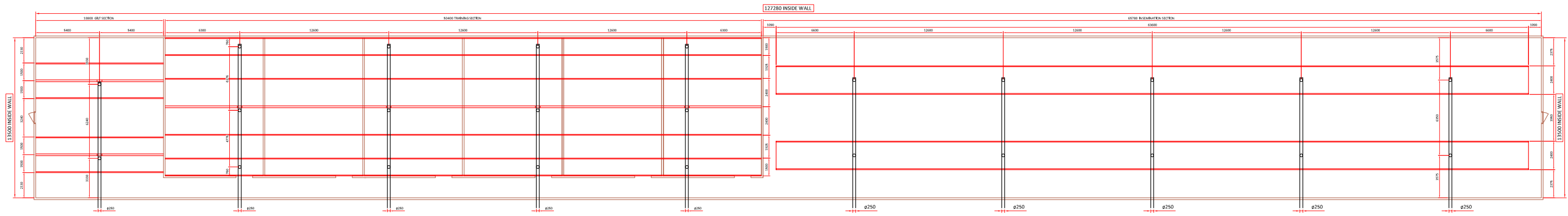
Layout
 Insemination - Heat detection and training

(mm) scale: 1:~ drawing: 20b
 (y-m-d) date: 2016-05-24 drawn: Joost

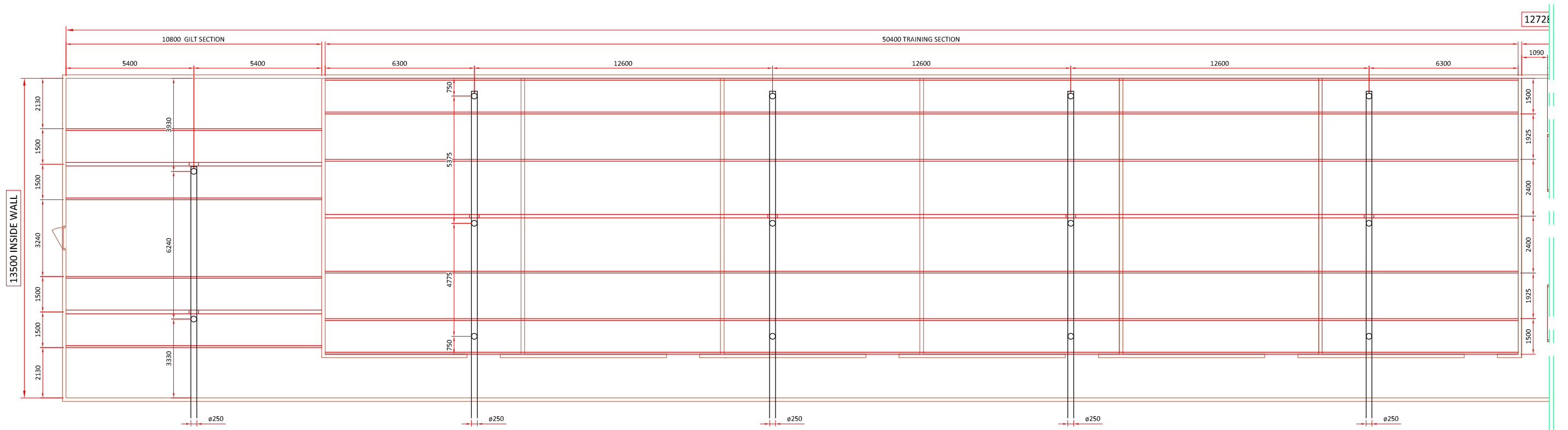
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1 Slurry
scale 1:325



2 Detail Gilt + Training section
scale 1:175

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

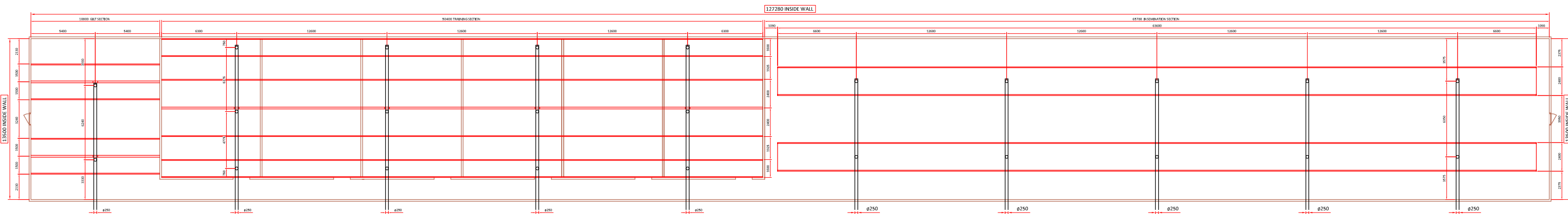
Slurry
 Insemination - Heat detection and training

(mm) scale: 1:~ drawing: 20c
 (y-m-d) date: 2016-05-24 drawn: Joost

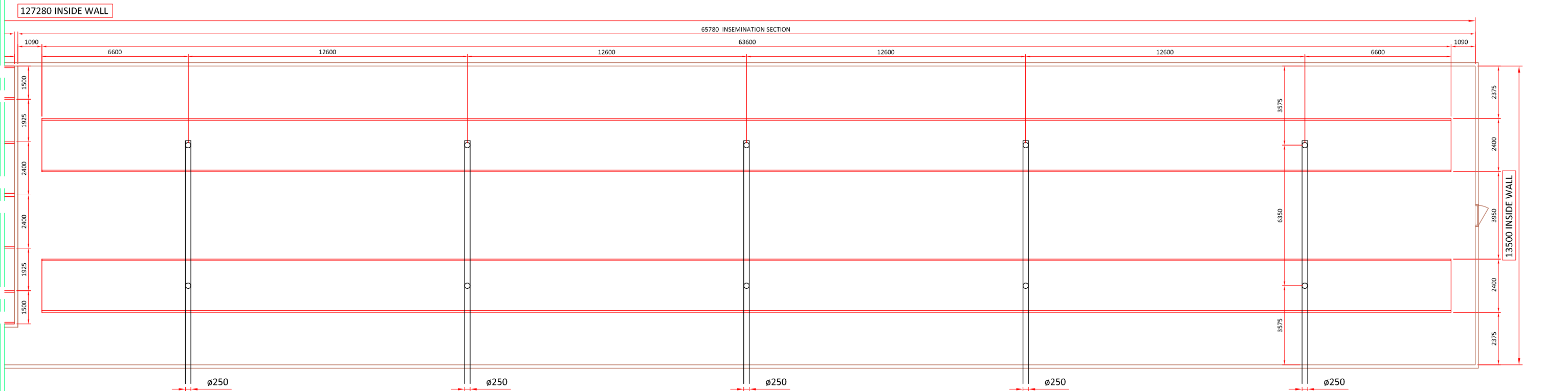
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1 Slurry
scale 1:325



2 Detail Insemination section
scale 1:175

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

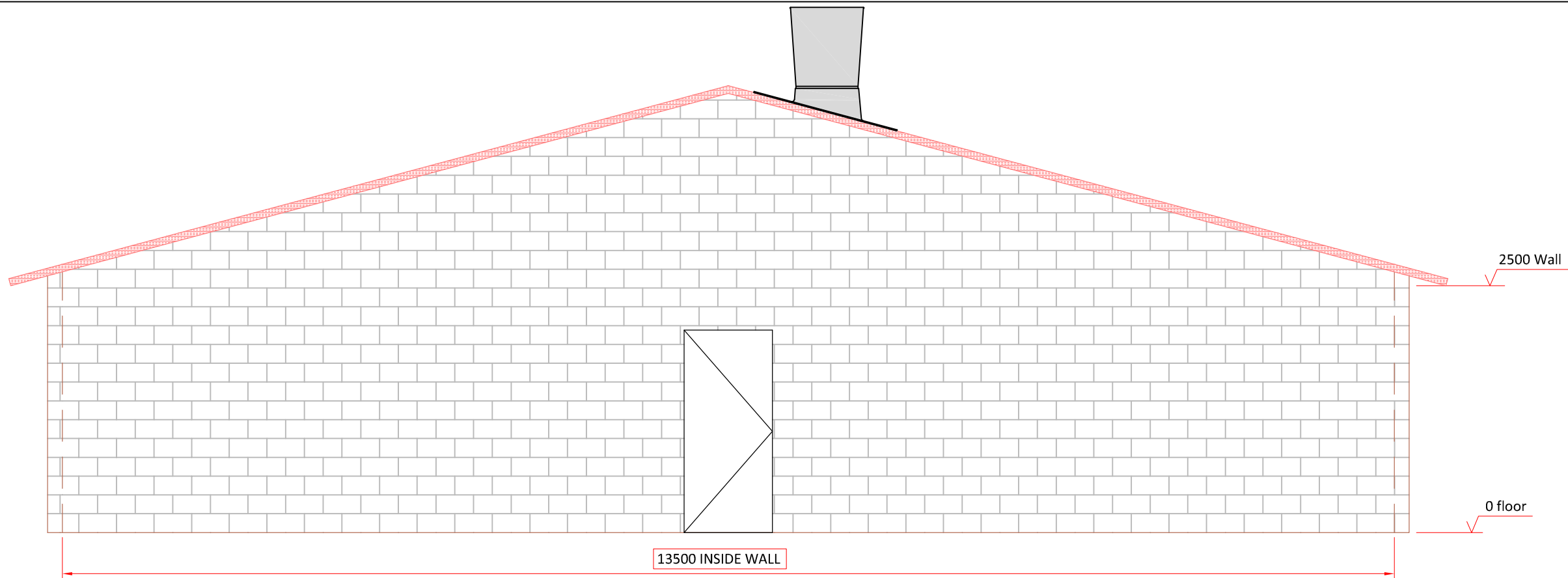
Slurry
 Insemination - Heat detection and training

(mm) scale: 1:~ drawing: 20d
 (y-m-d) date: 2016-05-24 drawn: Joost

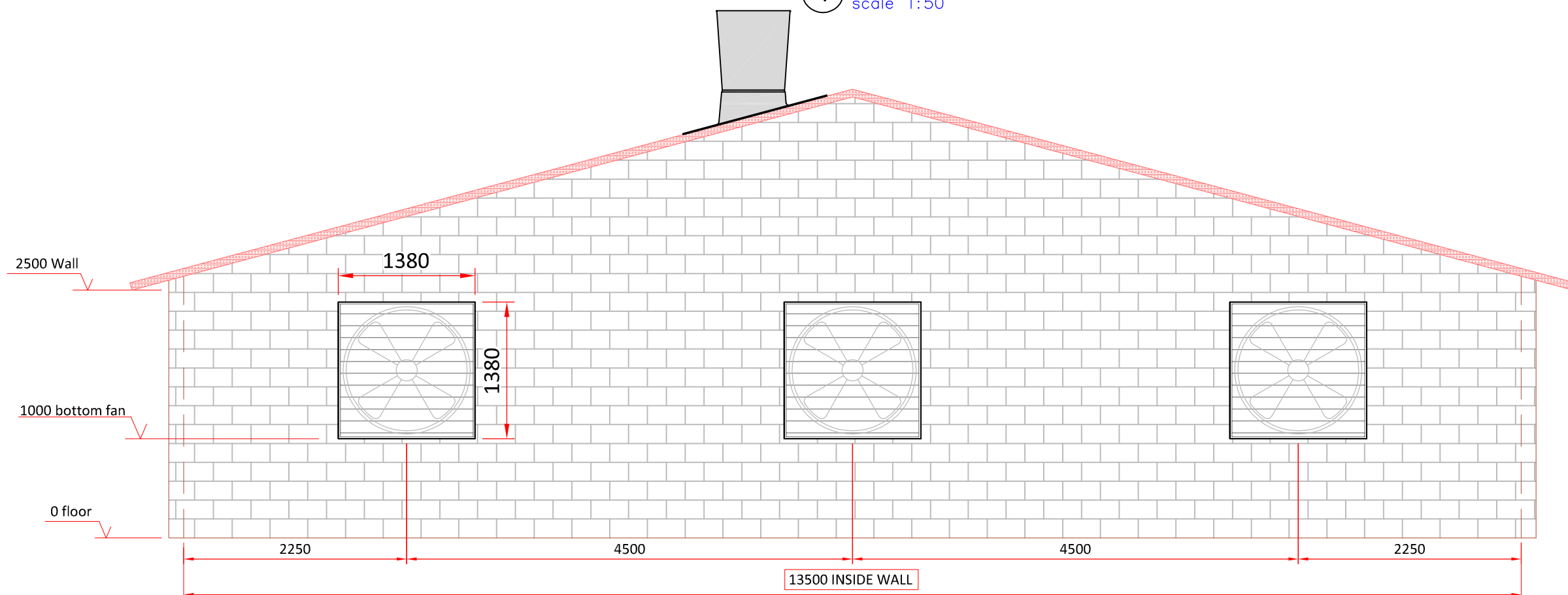
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1 View A
scale 1:50



2 View B
scale 1:50

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

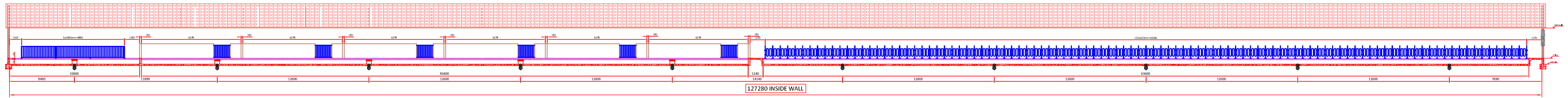
View A and B
 Insemination - Heat detection and training

(mm) scale: 1:~ drawing: 21
 (y-m-d) date: 2016-06-10 drawn: Joost

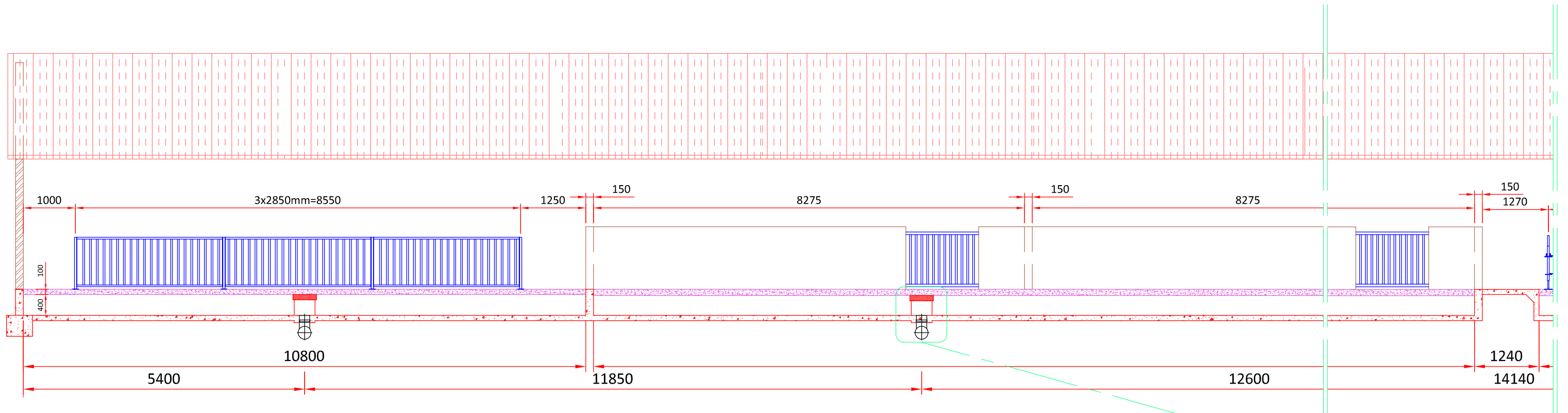
A3

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 | feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

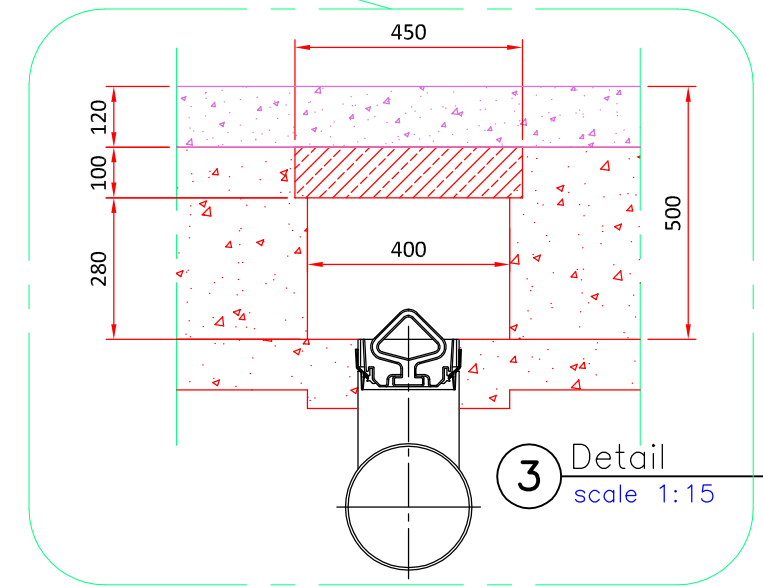
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1 View C-C
scale 1:350



2 Detail Gilt + Training section
scale 1:75



3 Detail
scale 1:15

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

View C-C Gilt dev.+training
 Insemination - Heat detection and training

(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 22a
 drawn: Joost

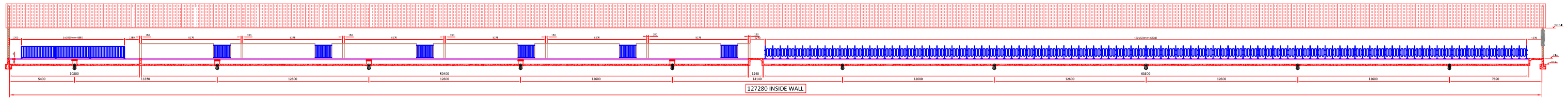
A3



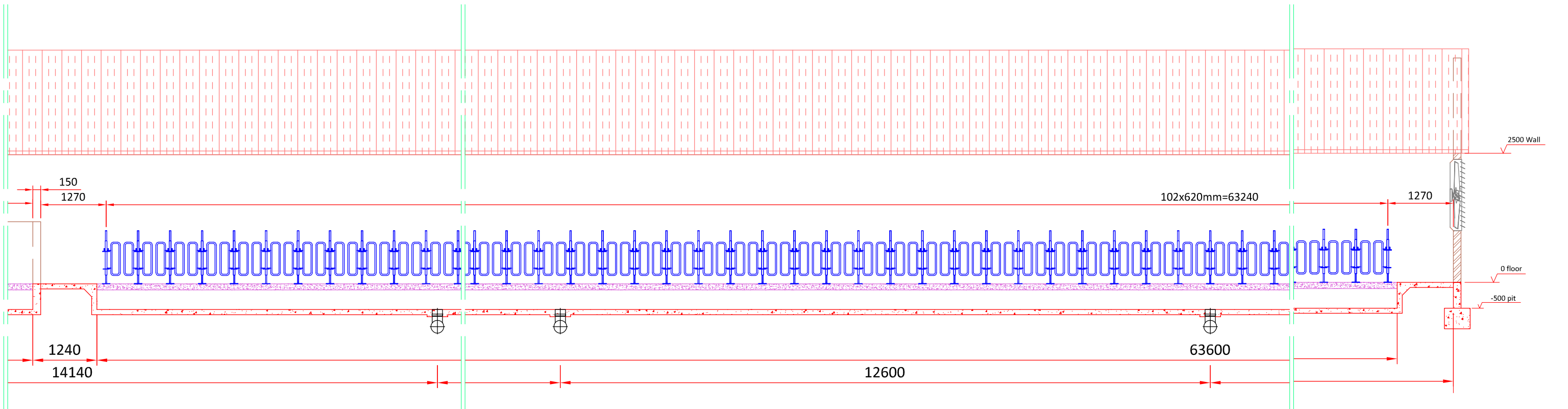
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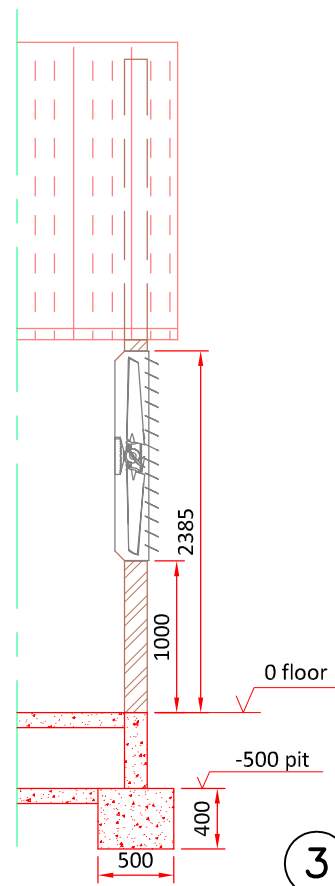
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1 View C-C
scale 1:350



2 Detail HD+Insemination
scale 1:75



3 Detail
scale 1:50

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

View C-C HD+Insemination
 Insemination - Heat detection and training

(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 22a
 drawn: Joost

A3

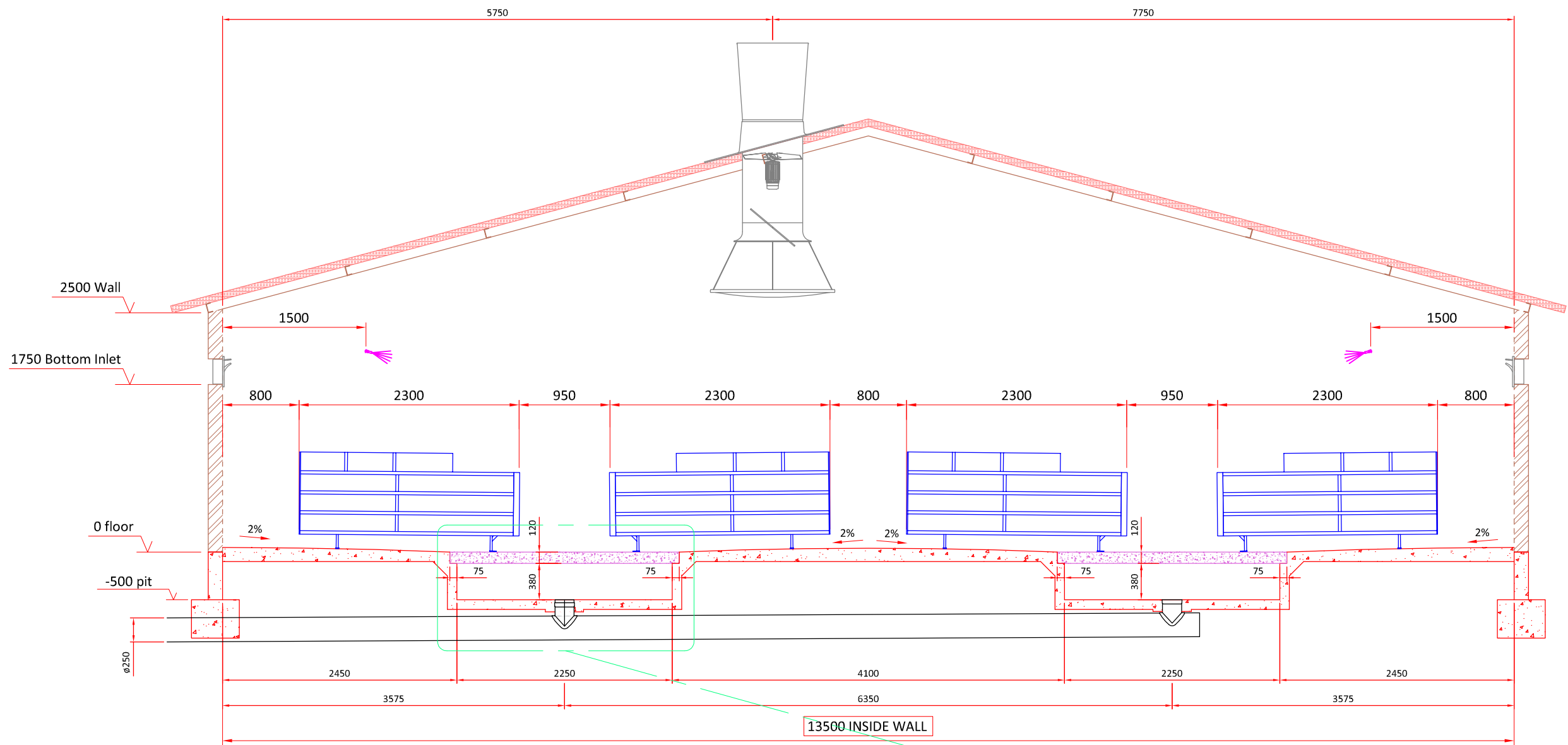
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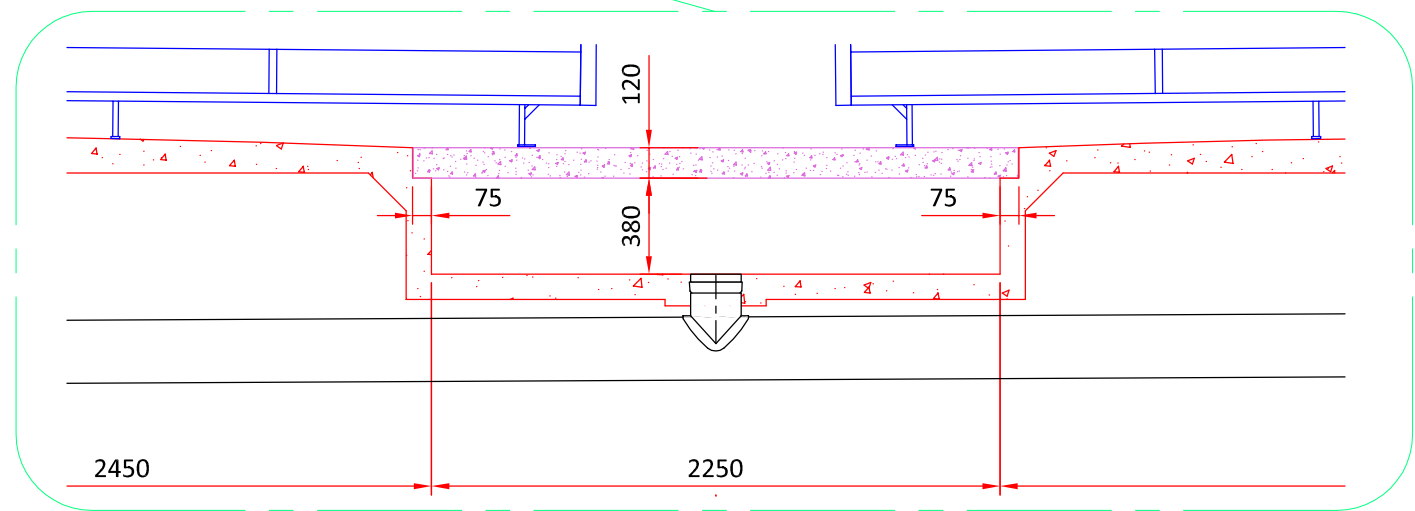
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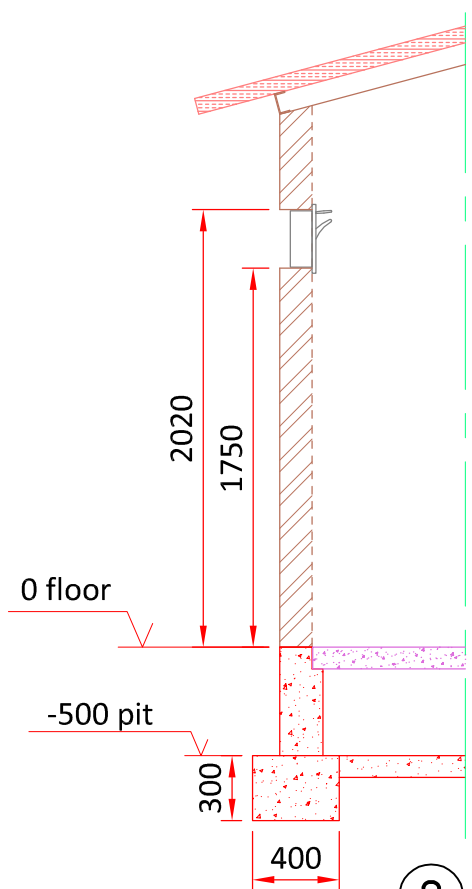
1 View D-D
scale 1:50



concrete minimal 100mm

3 Detail
scale 1:30

slurry system \varnothing 250
slope 0,5%



2 Detail
scale 1:35

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

View D-D

Insemination - Heat detection and training

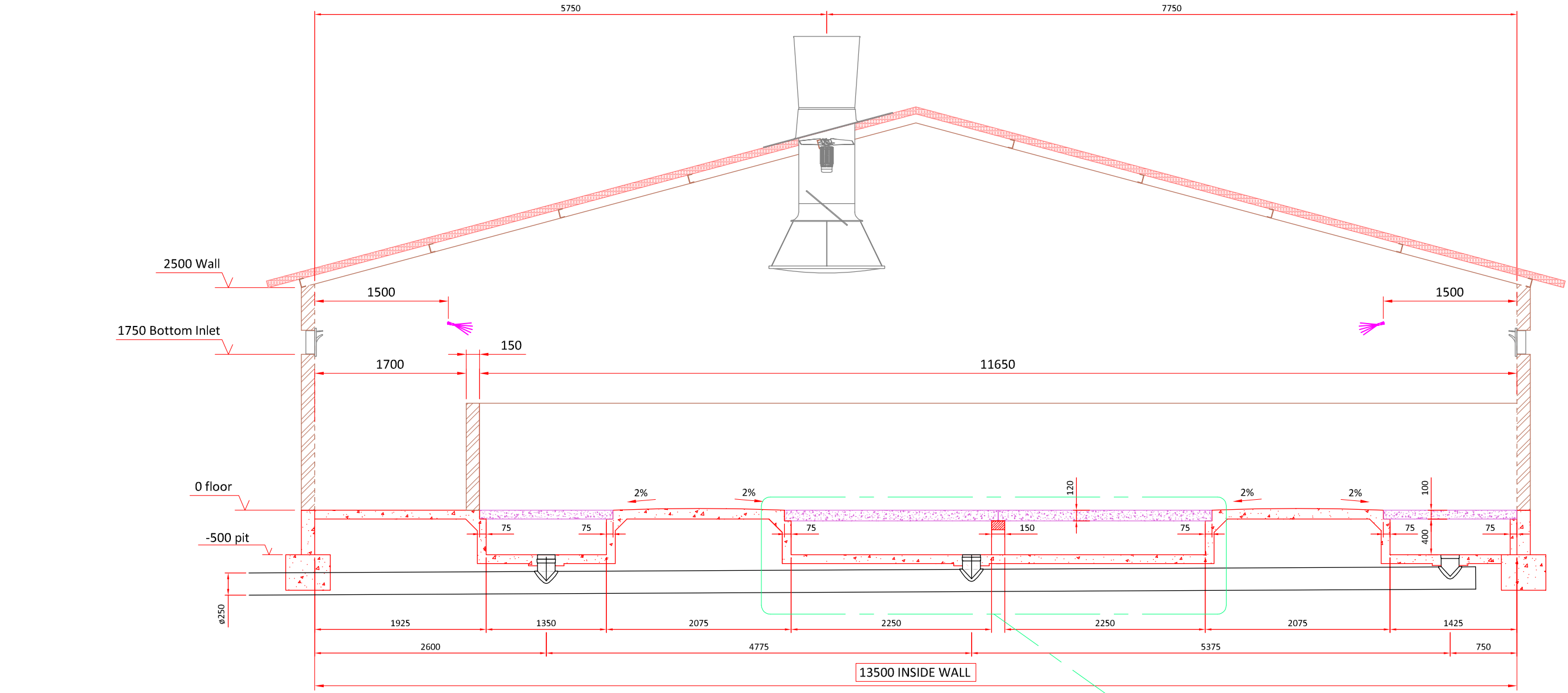
(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 23
 drawn: Joost

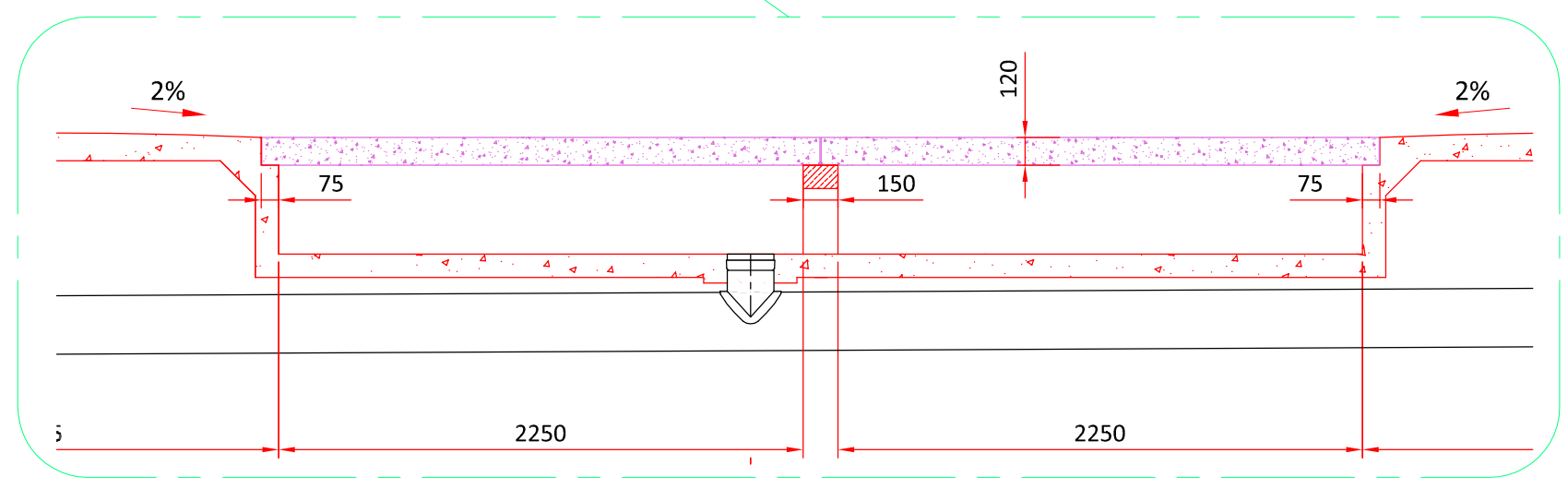
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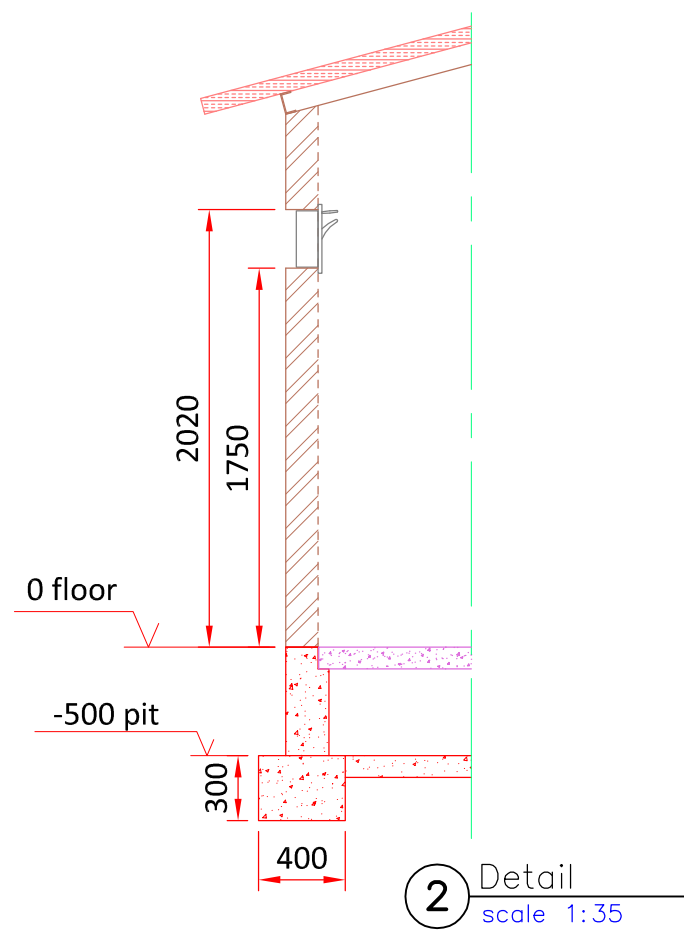


1 View E-E
scale 1:50



3 Detail
scale 1:30

slurry system $\phi 250$
slope 0,5%



2 Detail
scale 1:35

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

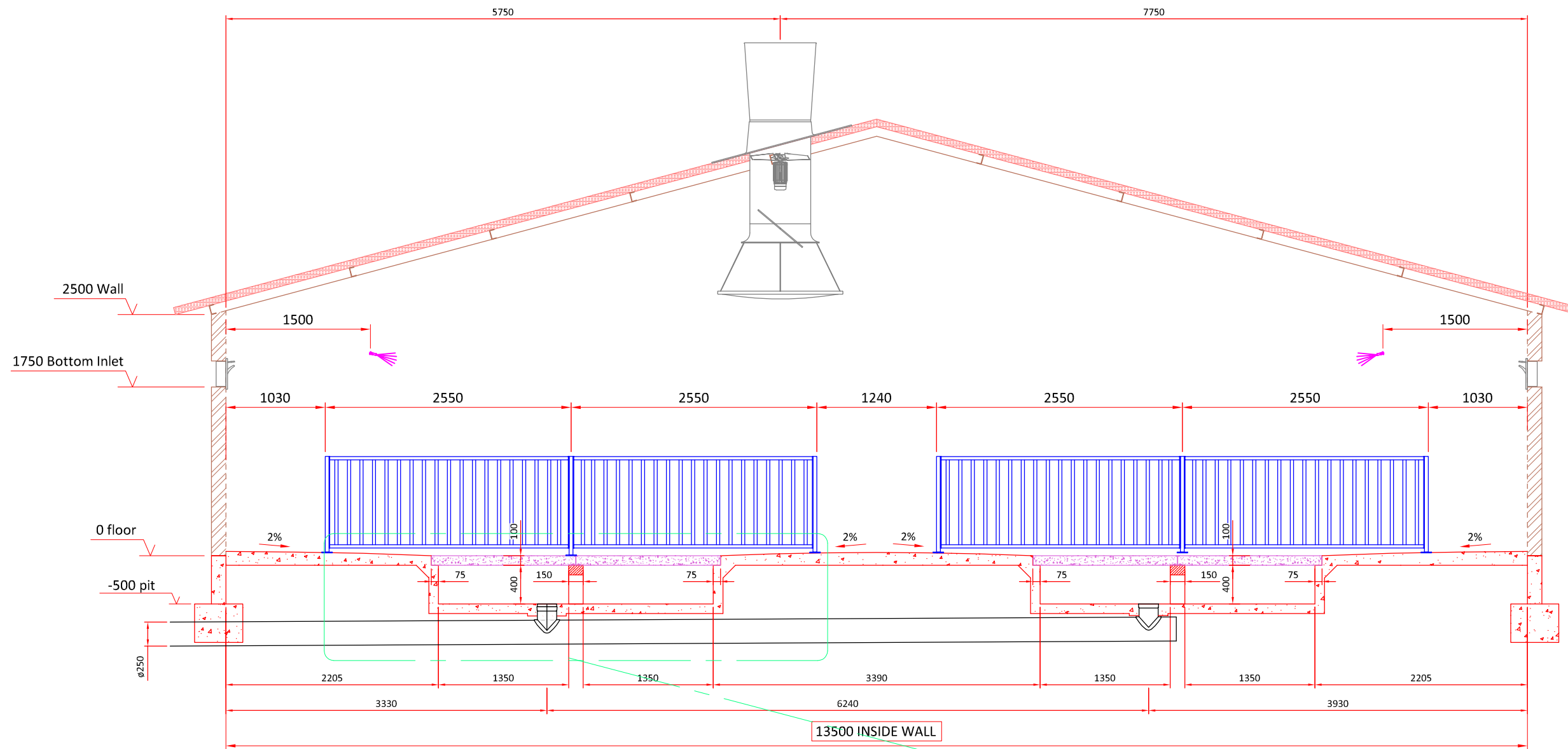
View E-E
 Insemination - Heat detection and training

(mm) scale: 1:~
 (y-m-d) date: 2016-06-10
 drawing: 24
 drawn: Joost

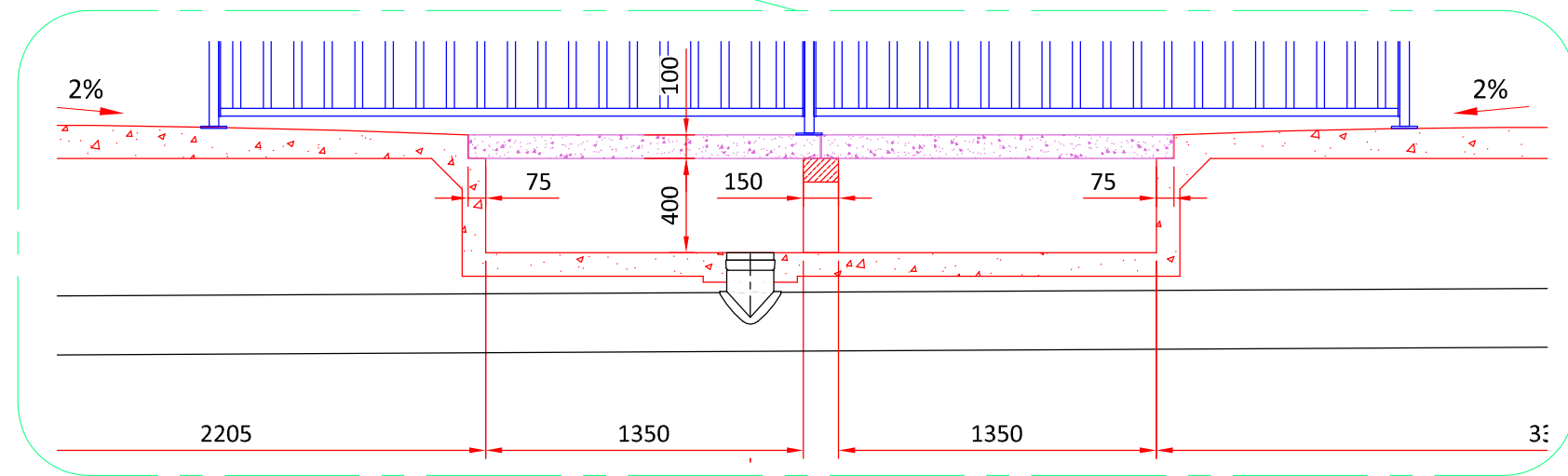
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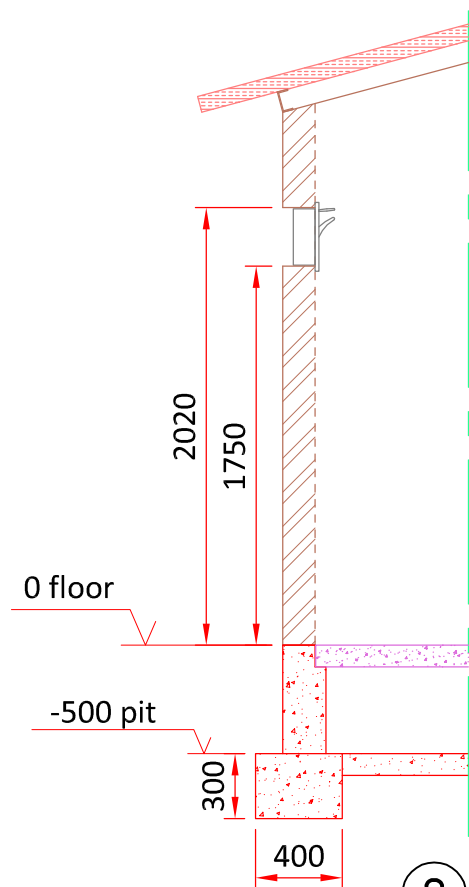


1 View F-F
scale 1:50



3 Detail
scale 1:30

slurry system $\varnothing 250$
slope 0,5%



2 Detail
scale 1:35

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

View F-F
 Insemination - Heat detection and training

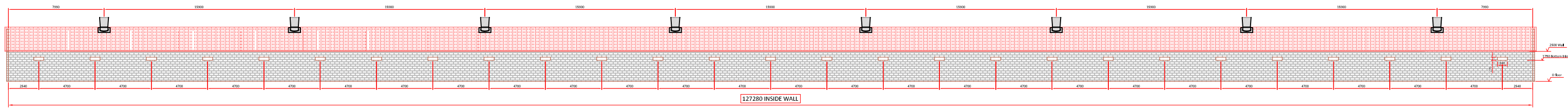
(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 25
 drawn: Joost

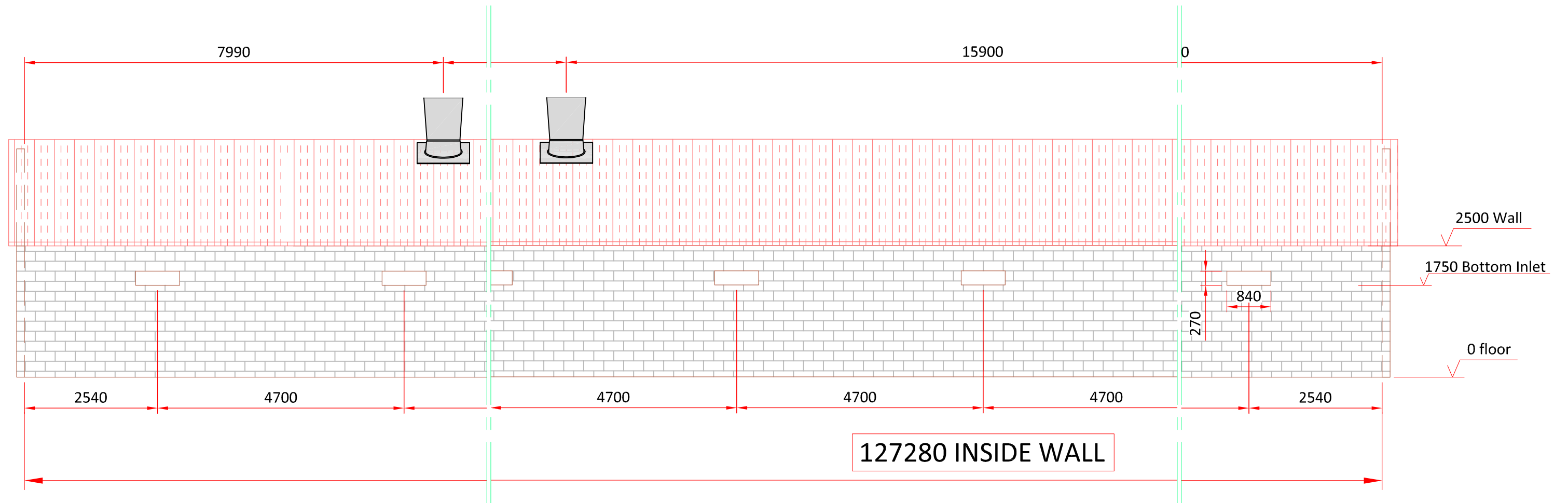
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1 View G
scale 1:350



2 Detail
scale 1:75

Project size: 4800 sows
 1 building (training section):
 2 sections of 6 gilt pens
 6 ESF training areas
 3 rows with 102 insemination stalls 620 c.o.c.
 1 row with 115 insemination stalls 550 c.o.c.
 Total 421 stalls

View G
 Insemination - Heat detection and training

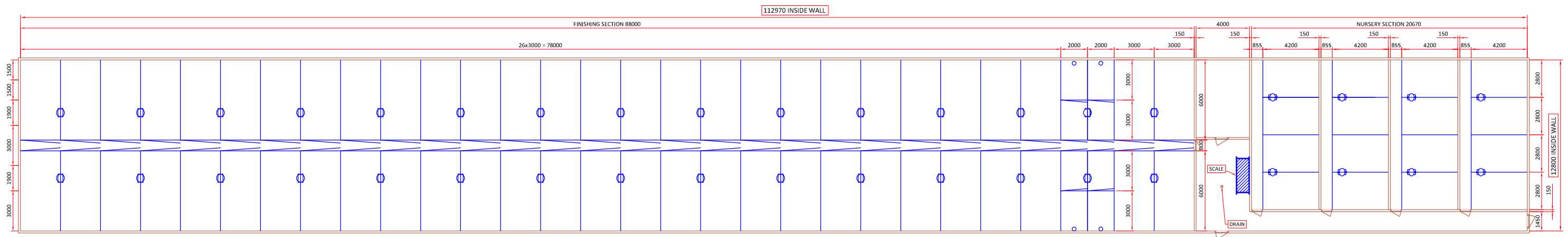
(mm) scale: 1:~
 (y-m-d) date: 2016-06-13

drawing: 26
 drawn: Joost

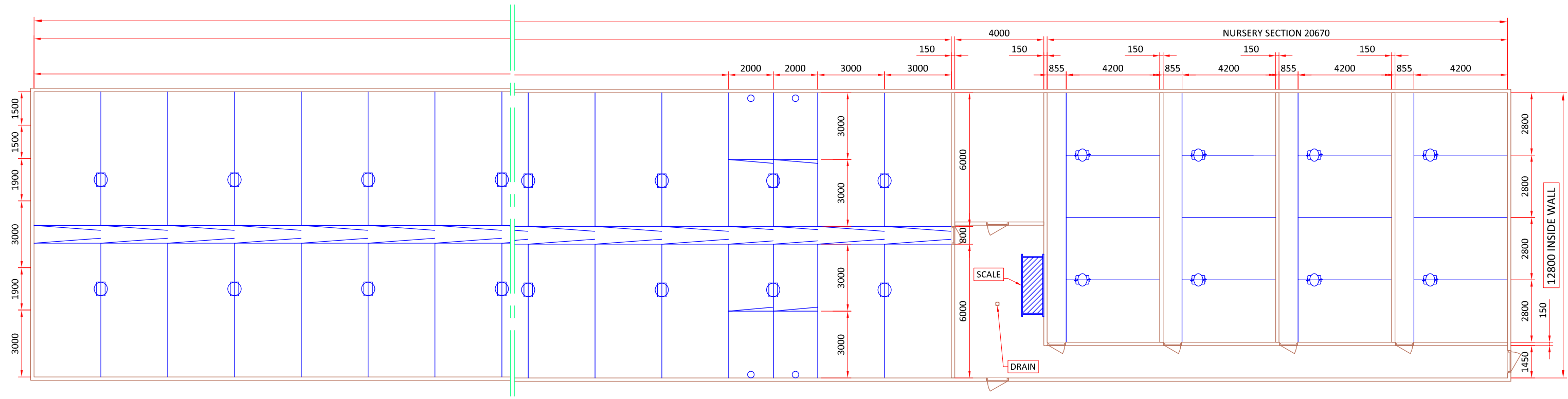
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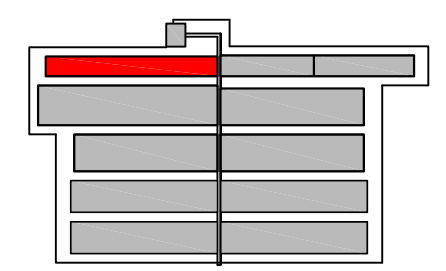
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2 Layout
scale 1:300



3 Detail
scale 1:175



1 Overview Site 1
scale 1:~

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

Layout
 Gilt development

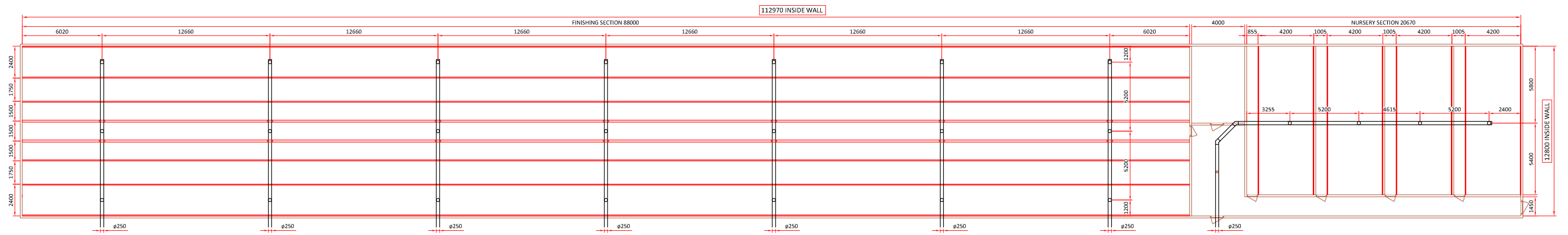
(mm) scale: 1:~
 (y-m-d) date: 2016-05-24

drawing: 10a
 drawn: Joost

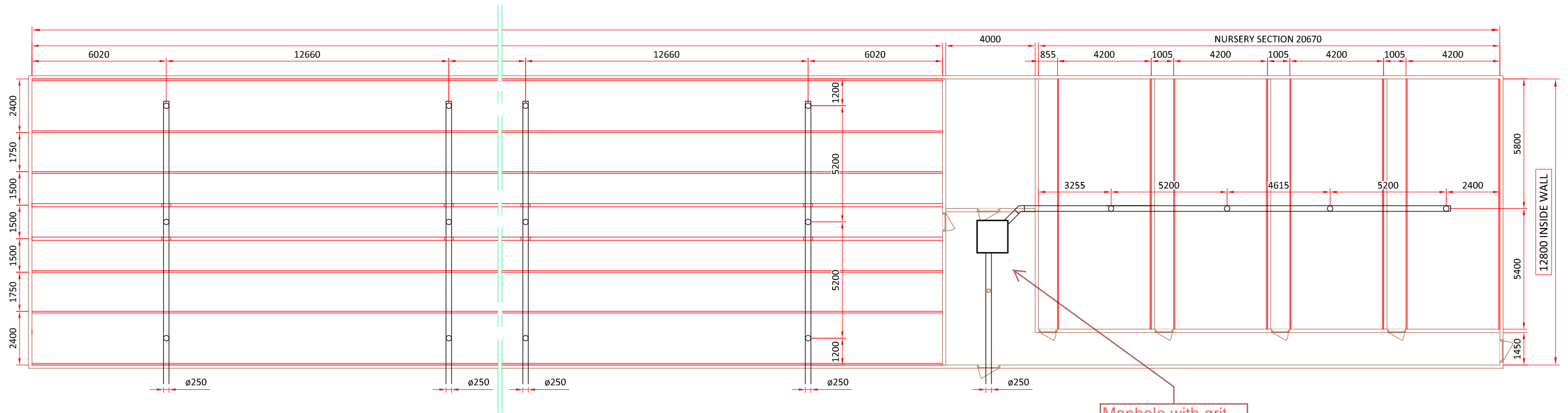
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1 Slurry
scale 1:300



2 Detail
scale 1:175

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

Slurry
 Gilt development

(mm) scale: 1:~
 (y-m-d) date: 2016-06-29

drawing: 10b
 drawn: Joost

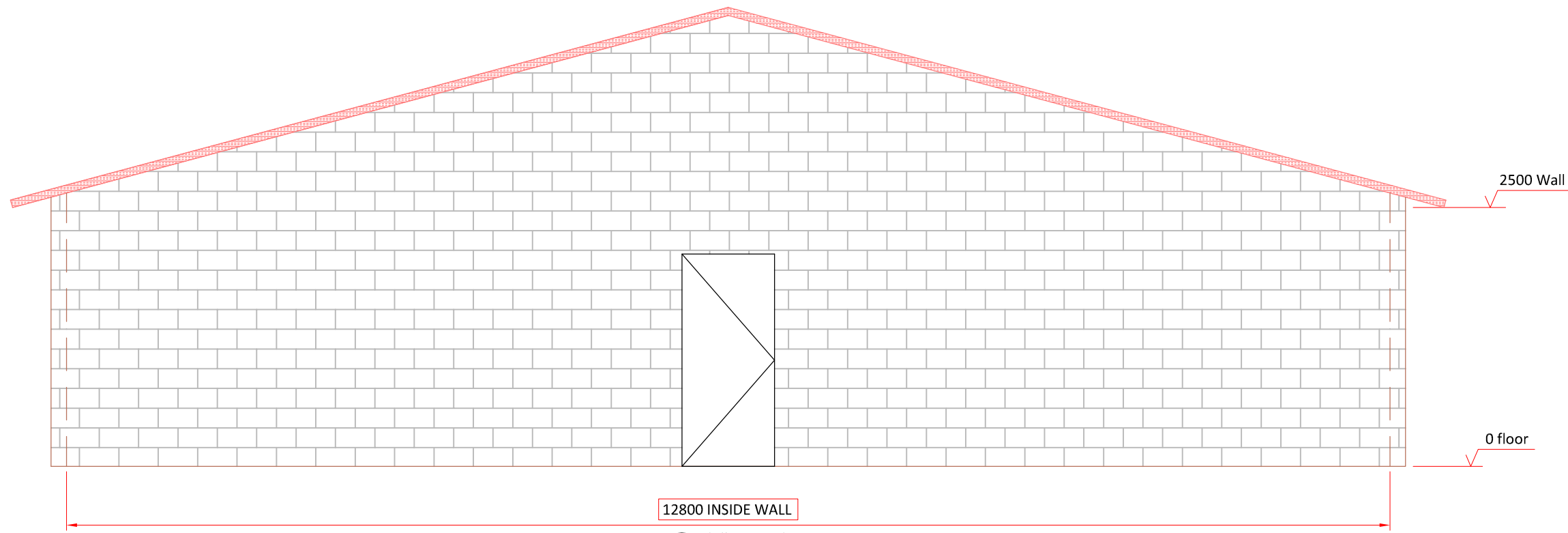
A3

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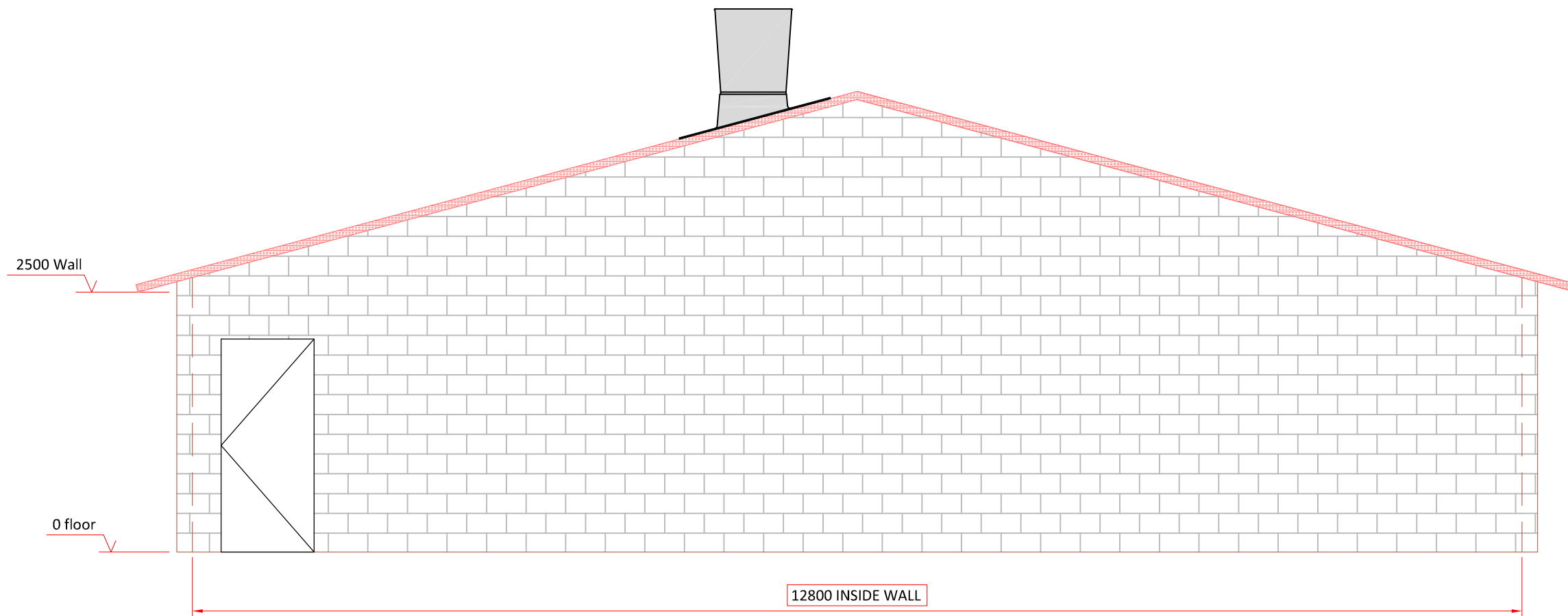
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| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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1 View A
scale 1:50



2 View B
scale 1:50

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

View A and B
 Gilt development

(mm) scale: 1:~
 (y-m-d) date: 2016-06-29

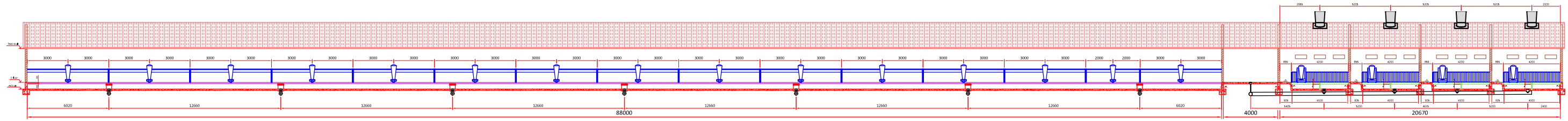
drawing: 11
 drawn: Joost

A3

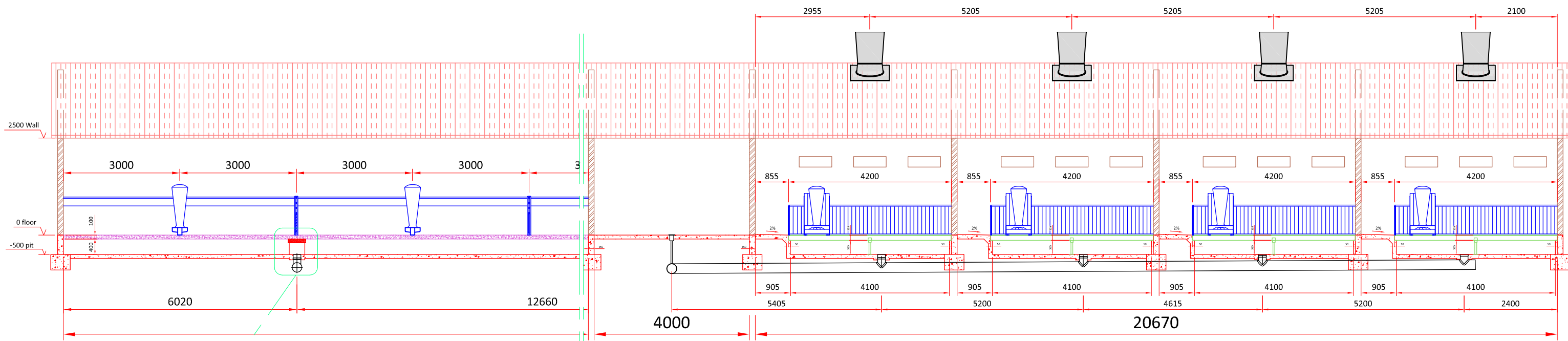
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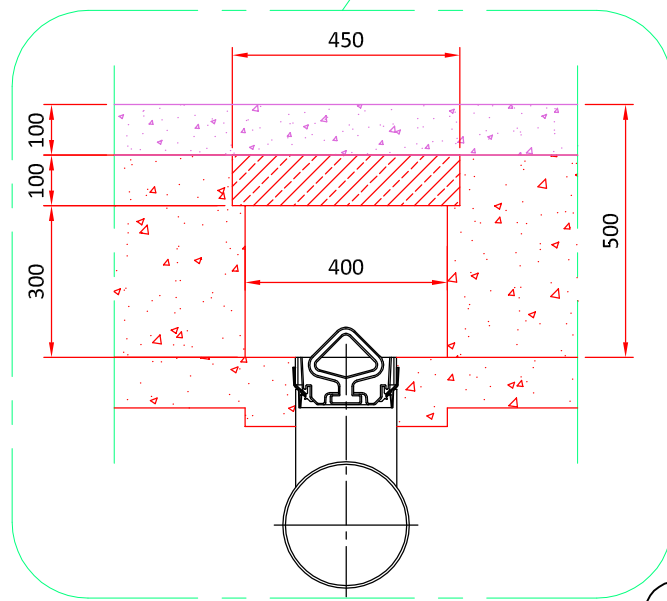
1 View C-C
scale 1:300



2 Detail
scale 1:100

slurry system $\varnothing 250$
slope 0,5%

concrete minimal 100mm



3 Detail
scale 1:15

Project size: 4800 sows
1 building
4 nursery rooms with 4 pens per room
1 finishing room with 56 pens and
8 special care pens

View C-C
Gilt development

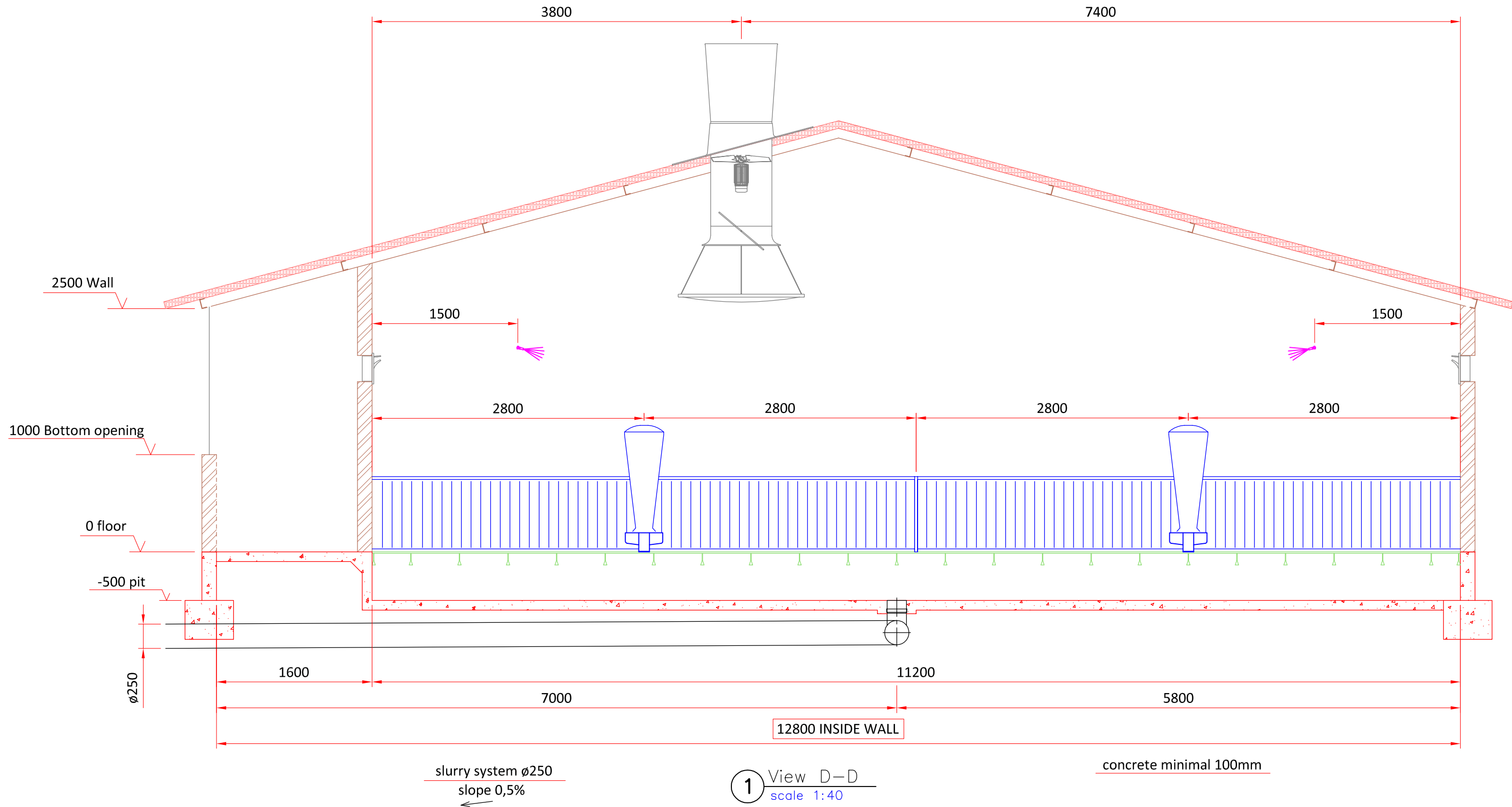
(mm) scale: 1:~
(y-m-d) date: 2016-06-29

drawing: 12
drawn: Joost

A3

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Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

View D-D
 Gilt development

(mm) scale: 1:~
 (y-m-d) date: 2016-06-29

drawing: 13
 drawn: Joost

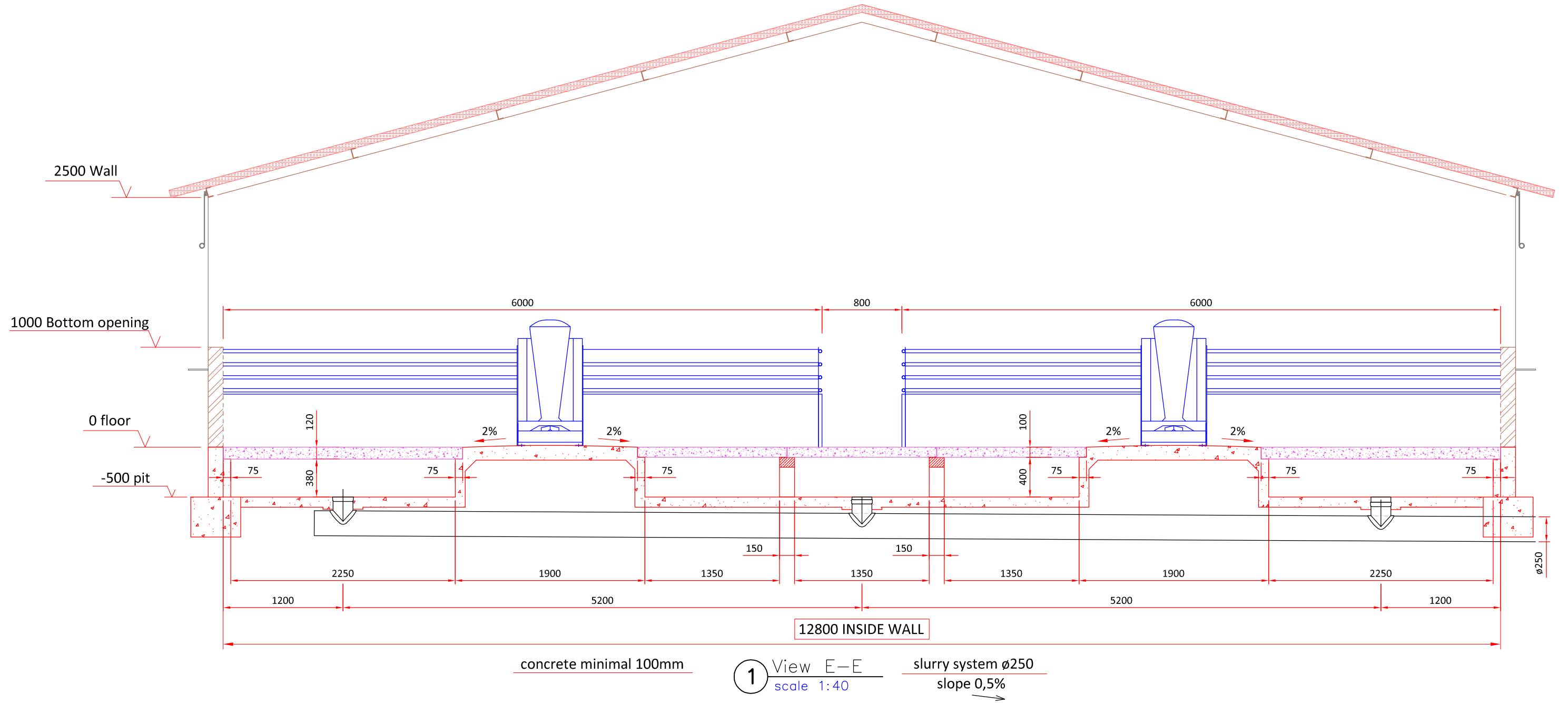
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Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

View E-E
 Gilt development

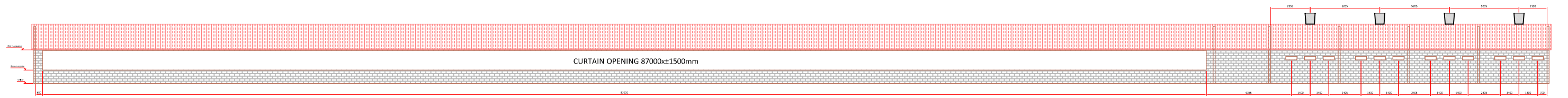
(mm) scale: 1:~
 (y-m-d) date: 2016-06-29

drawing: 14
 drawn: Joost

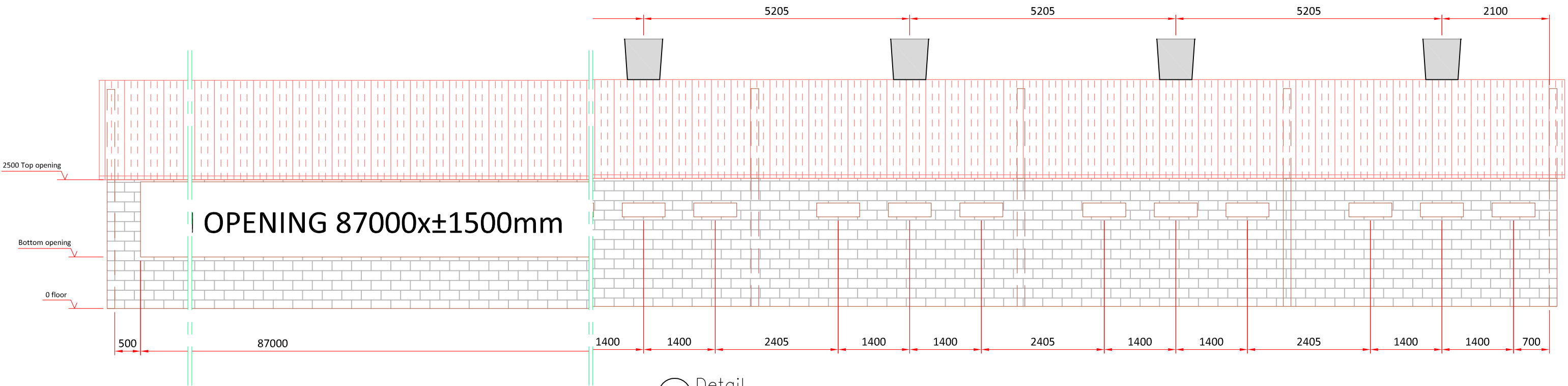
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1 View F
scale 1:300



2 Detail
scale 1:75

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

View F
 Gilt development

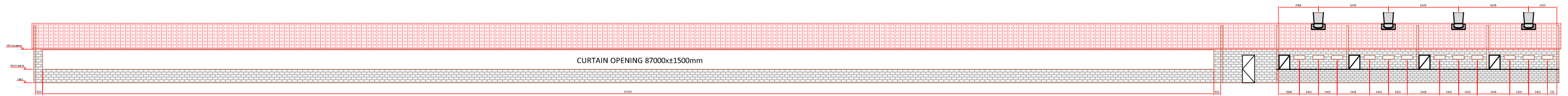
(mm) scale: 1:~
 (y-m-d) date: 2016-06-29

drawing: 15
 drawn: Joost

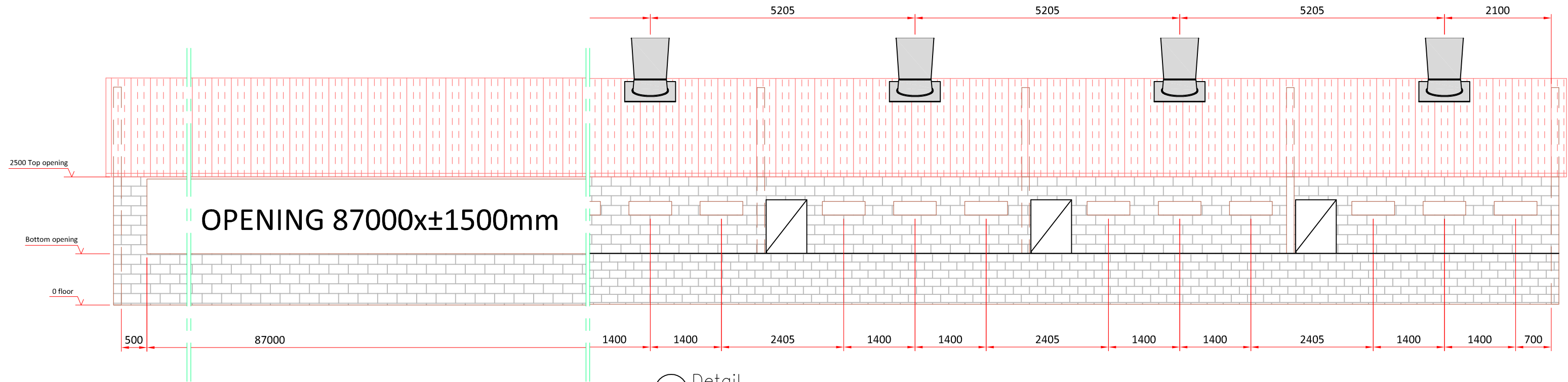
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1 View G
scale 1:300



2 Detail
scale 1:75

Project size: 4800 sows
 1 building
 4 nursery rooms with 4 pens per room
 1 finishing room with 56 pens and
 8 special care pens

View G
 Gilt development

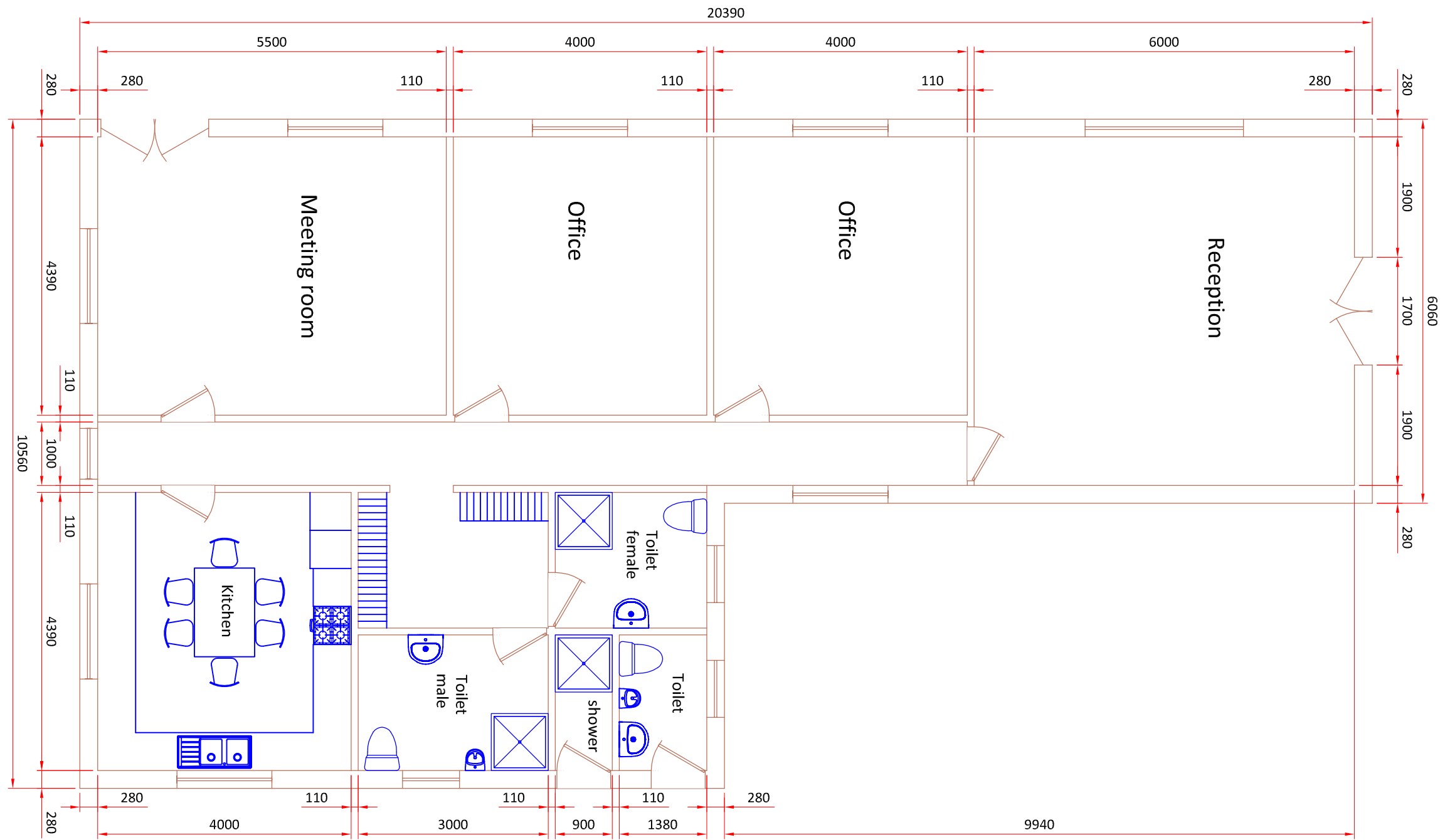
(mm) scale: 1:~
 (y-m-d) date: 2016-06-29

drawing: 16
 drawn: Joost

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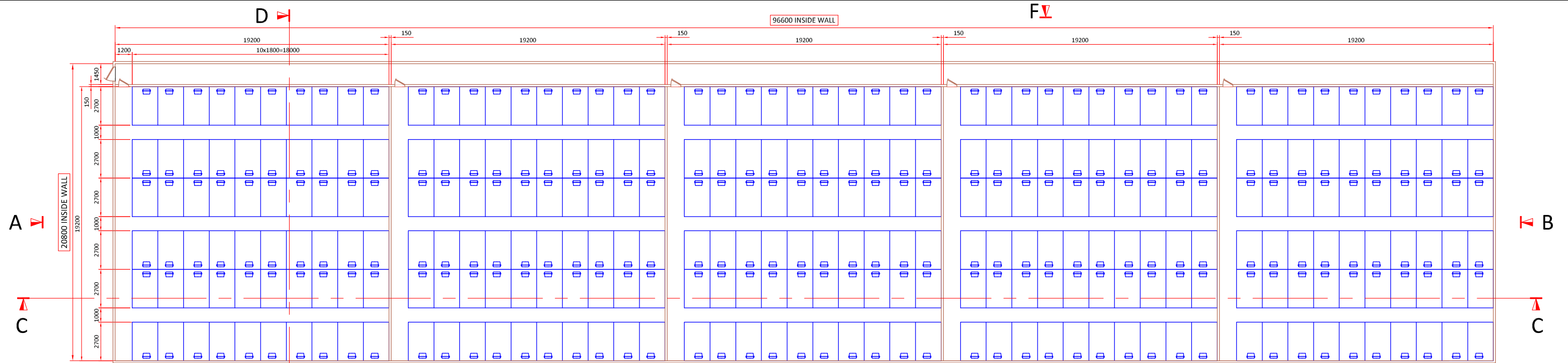
client: 4800 sow farm

Layout
Main Office

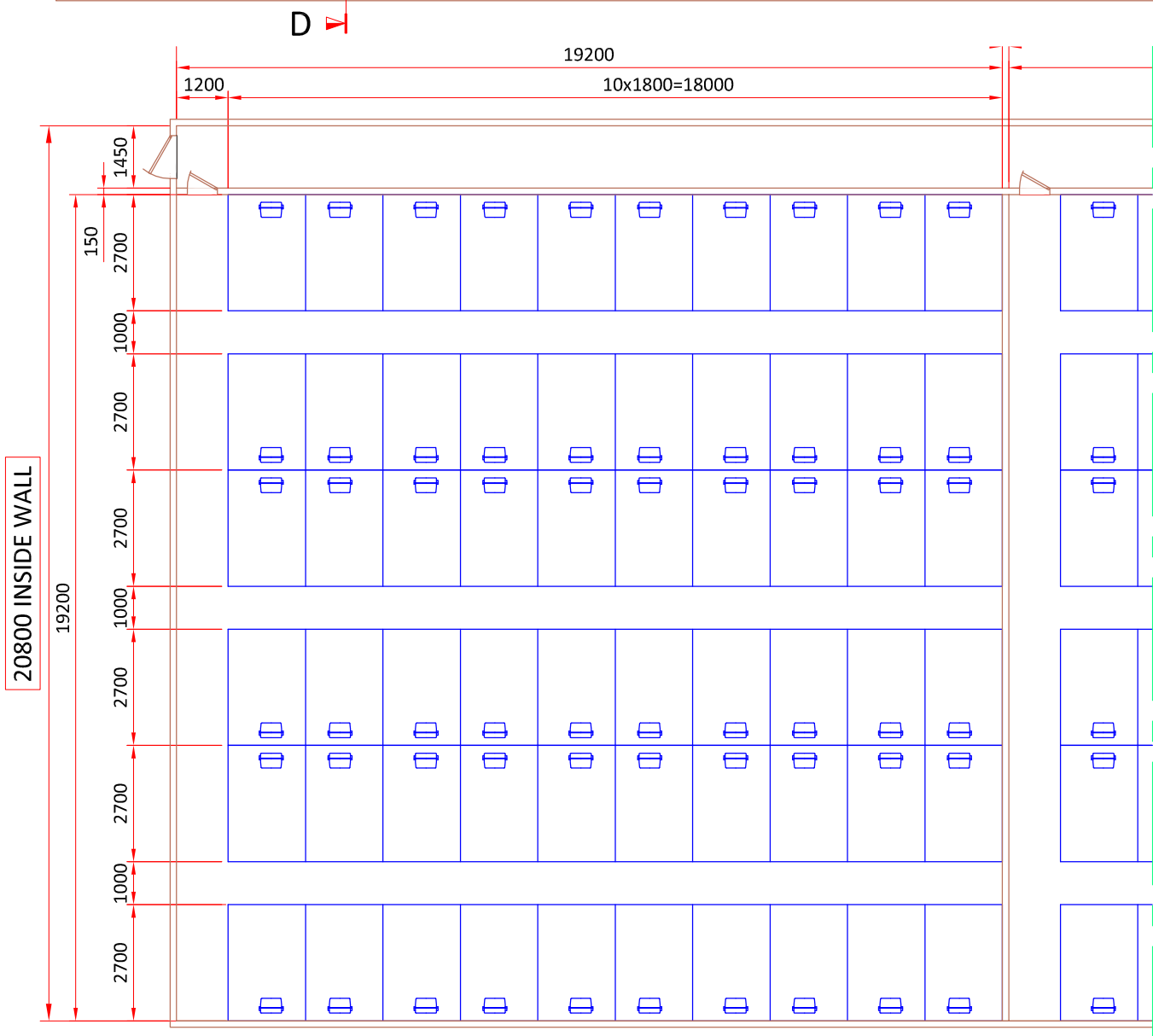
(mm) scale: 1:75 drawing: 80e
(y-m-d) date: 2016-07-22 drawn: Joost

A3

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2 Layout
scale 1:275



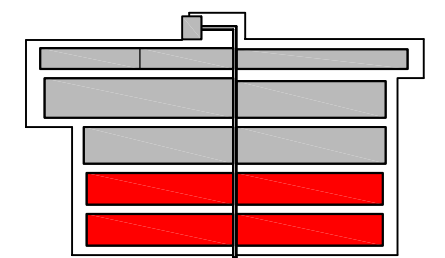
3 Detail
scale 1:150

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

Layout
Farrowing

(mm) scale: 1:~
 (y-m-d) date: 2016-05-25
 drawing: 50a
 drawn: Joost

A3

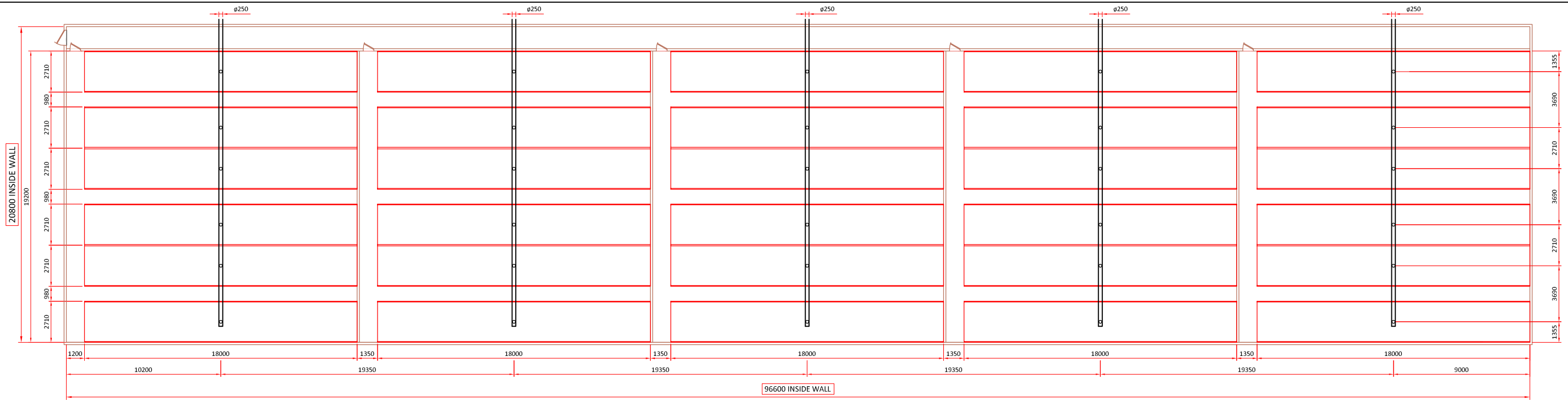


1 Overview Site 1
scale 1:~

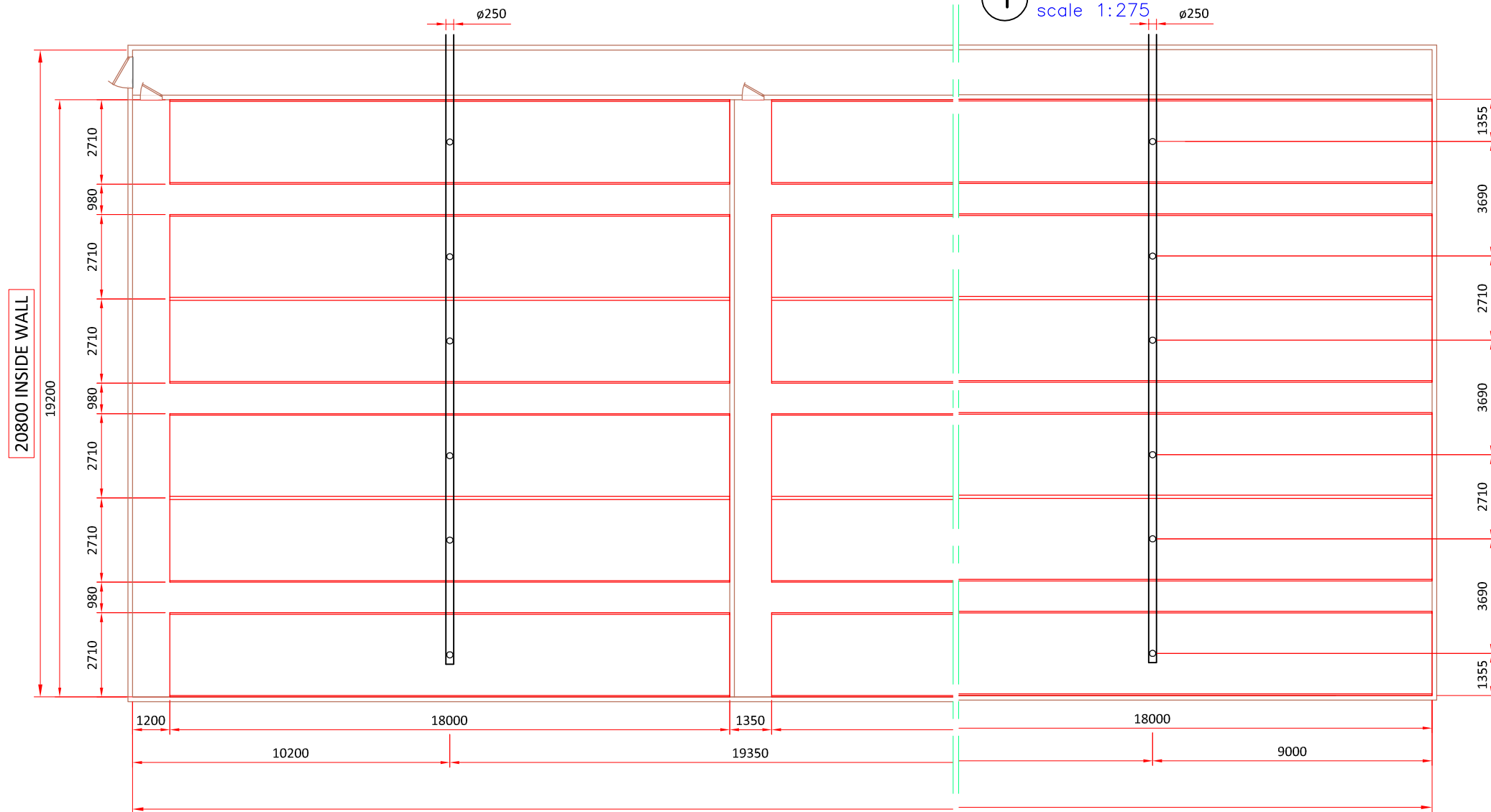


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 | feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

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1 Slurry
scale 1:275



2 Detail
scale 1:175

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

Slurry
 Farrowing

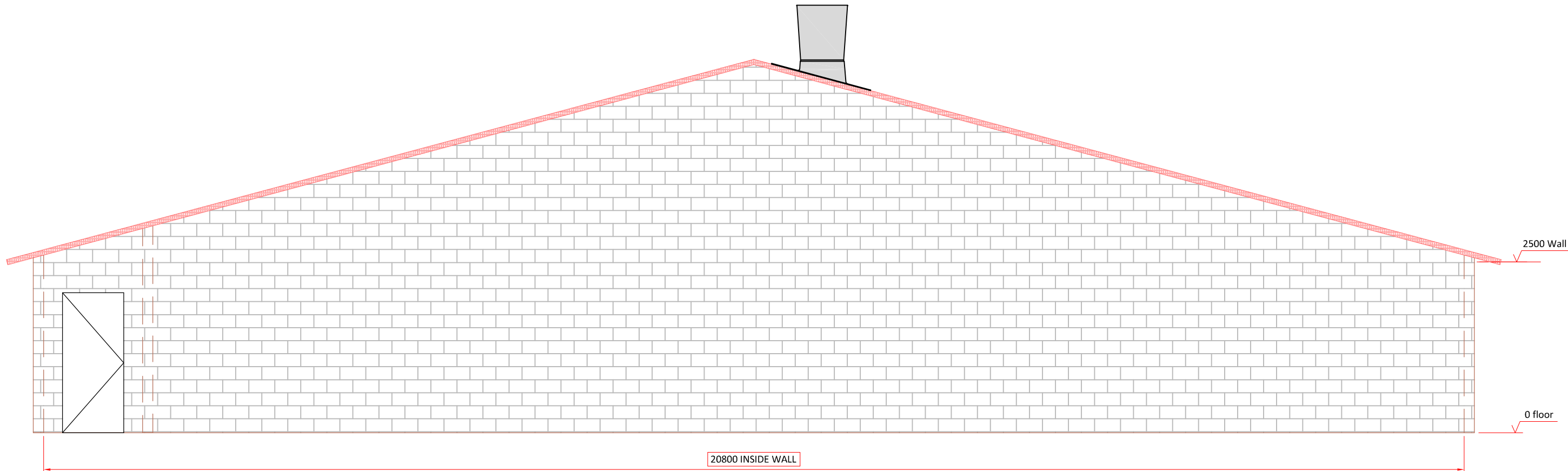
(mm) scale: 1:~
 (y-m-d) date: 2016-05-25

drawing: 50b
 drawn: Joost

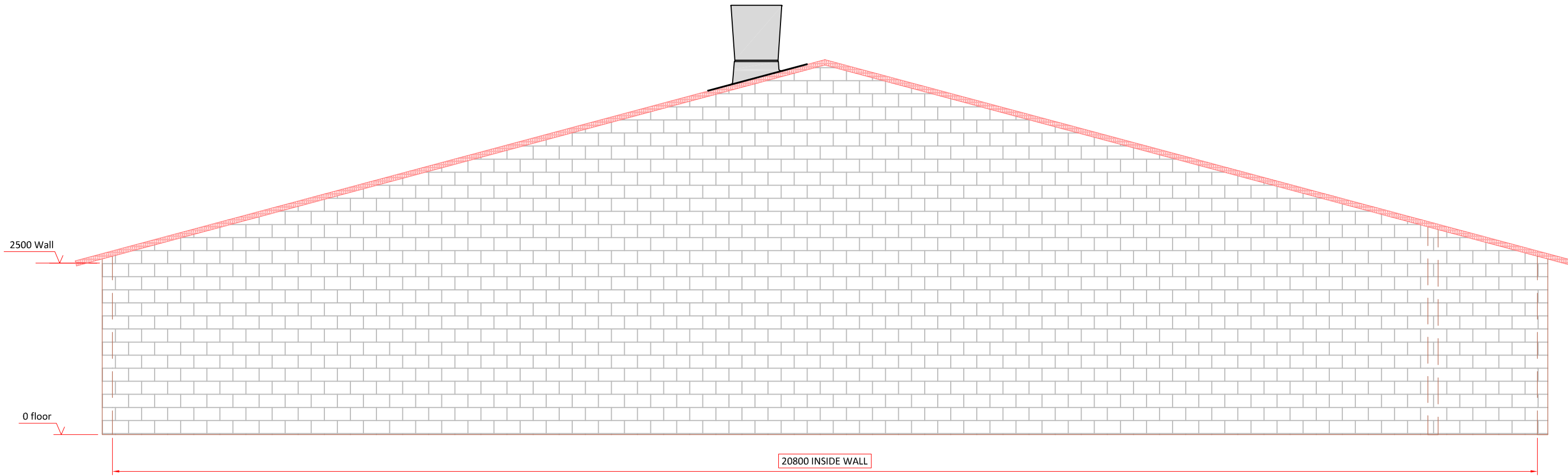
A3

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1 View A
scale 1:60



2 View B
scale 1:60

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

View A and B
Farrowing

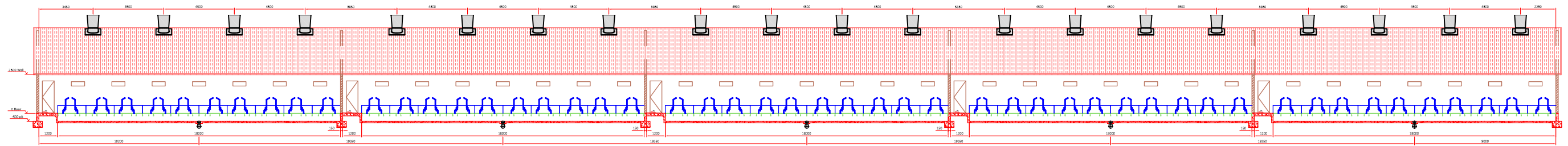
(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 51
 drawn: Joost

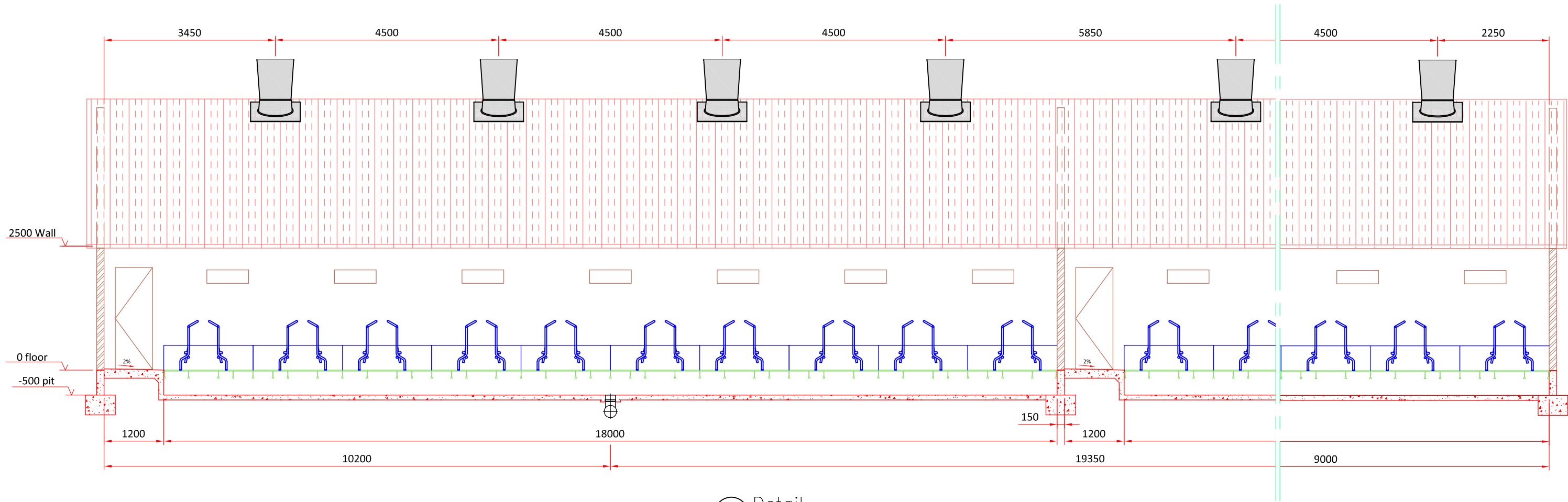
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1 View C-C
scale 1:275



2 Detail
scale 1:80

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

View C-C
Farrowing

(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

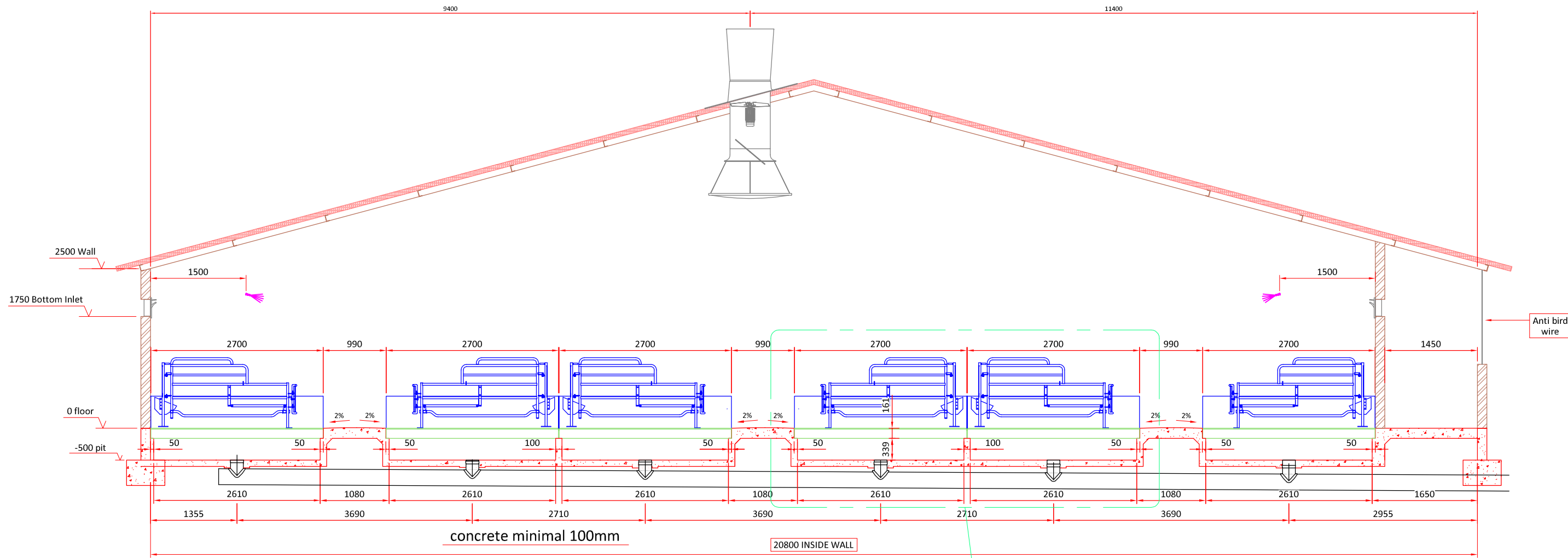
drawing: 52
 drawn: Joost

A3



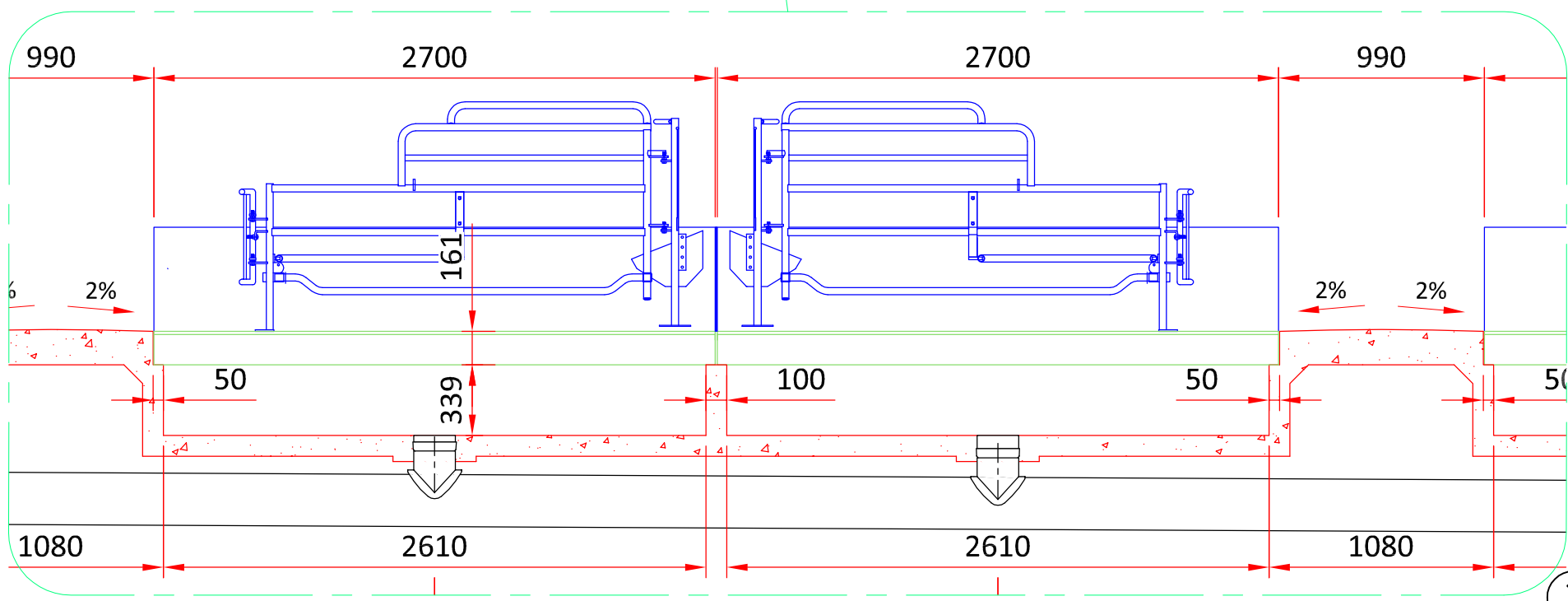
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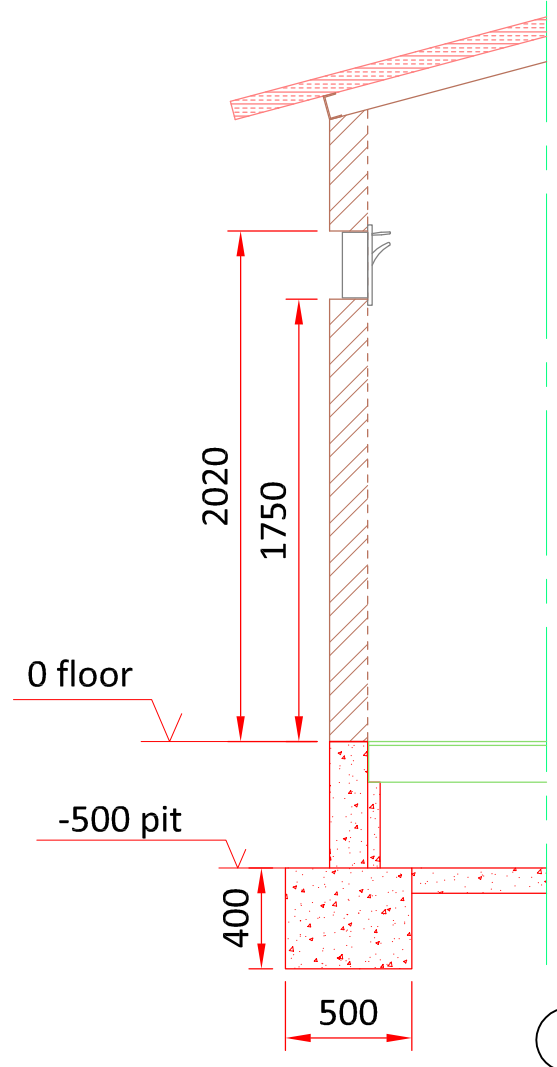


1 View D-D
scale 1:65

slurry system ø250
slope 0,5%



3 Detail
scale 1:30



2 Detail
scale 1:30

Project size: 4800 sows
4 buildings
5 rooms with 60 farrowing crates per room
crate dimensions 1800x2700mm
Total 1200 farrowing crates

View D-D
Farrowing

(mm) scale: 1:~
(y-m-d) date: 2016-06-10

drawing: 53
drawn: Joost

A3

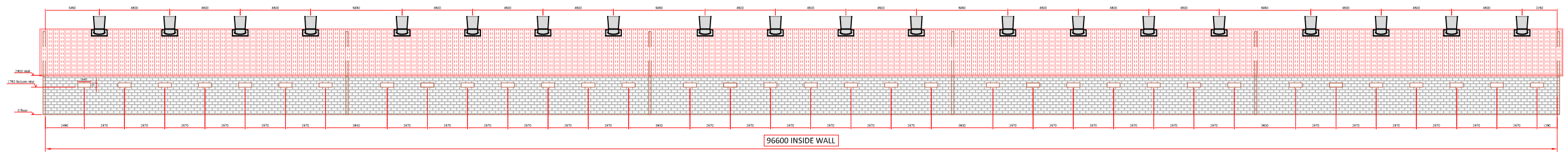
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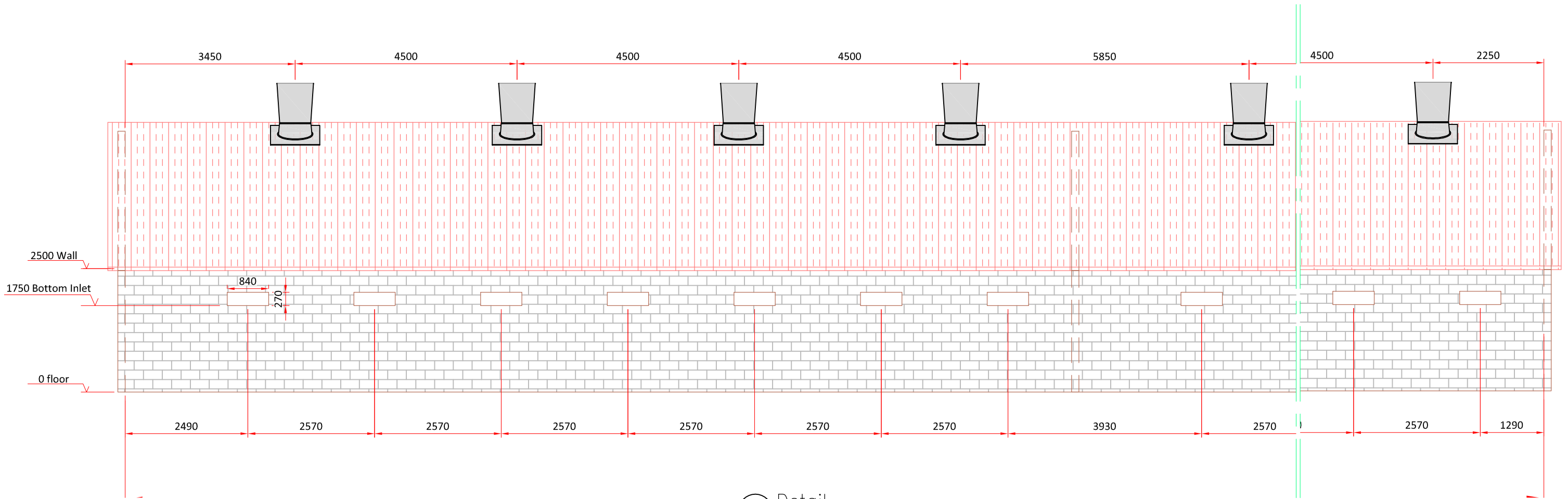
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1 View E
scale 1:275



2 Detail
scale 1:80

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

View E
 Farrowing

(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 54
 drawn: Joost

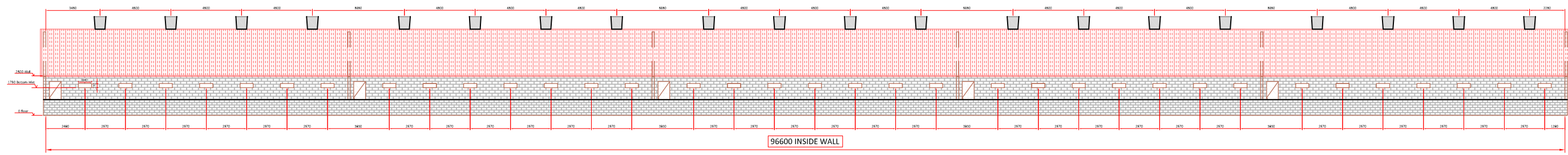
A3



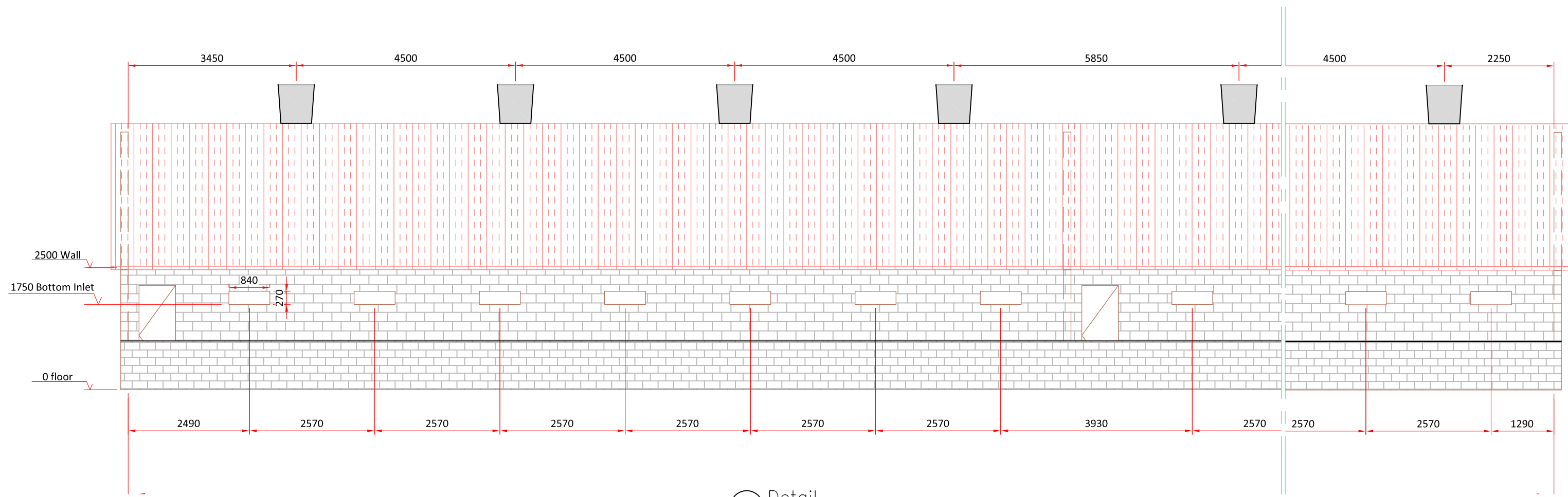
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1 View F
scale 1:275



2 Detail
scale 1:80

Project size: 4800 sows
 4 buildings
 5 rooms with 60 farrowing crates per room
 crate dimensions 1800x2700mm
 Total 1200 farrowing crates

View F
 Farrowing

(mm) scale: 1:~
 (y-m-d) date: 2016-06-10

drawing: 55
 drawn: Joost

A3

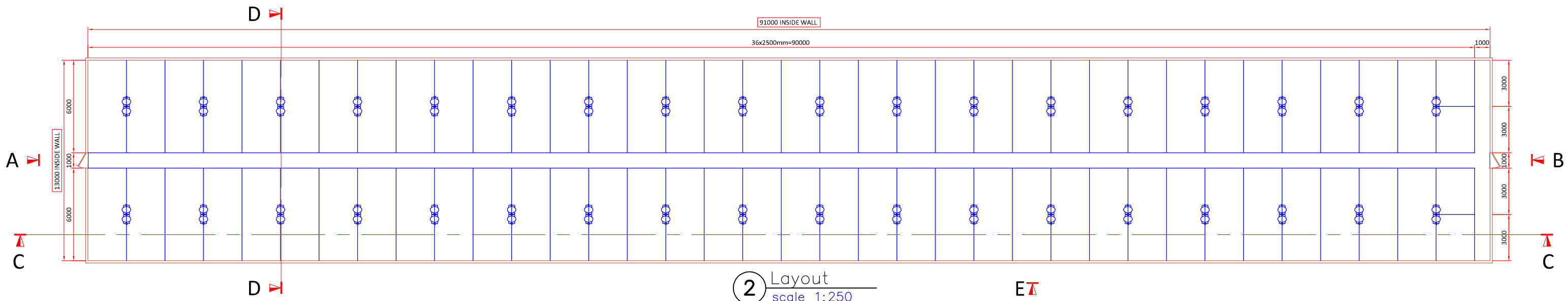
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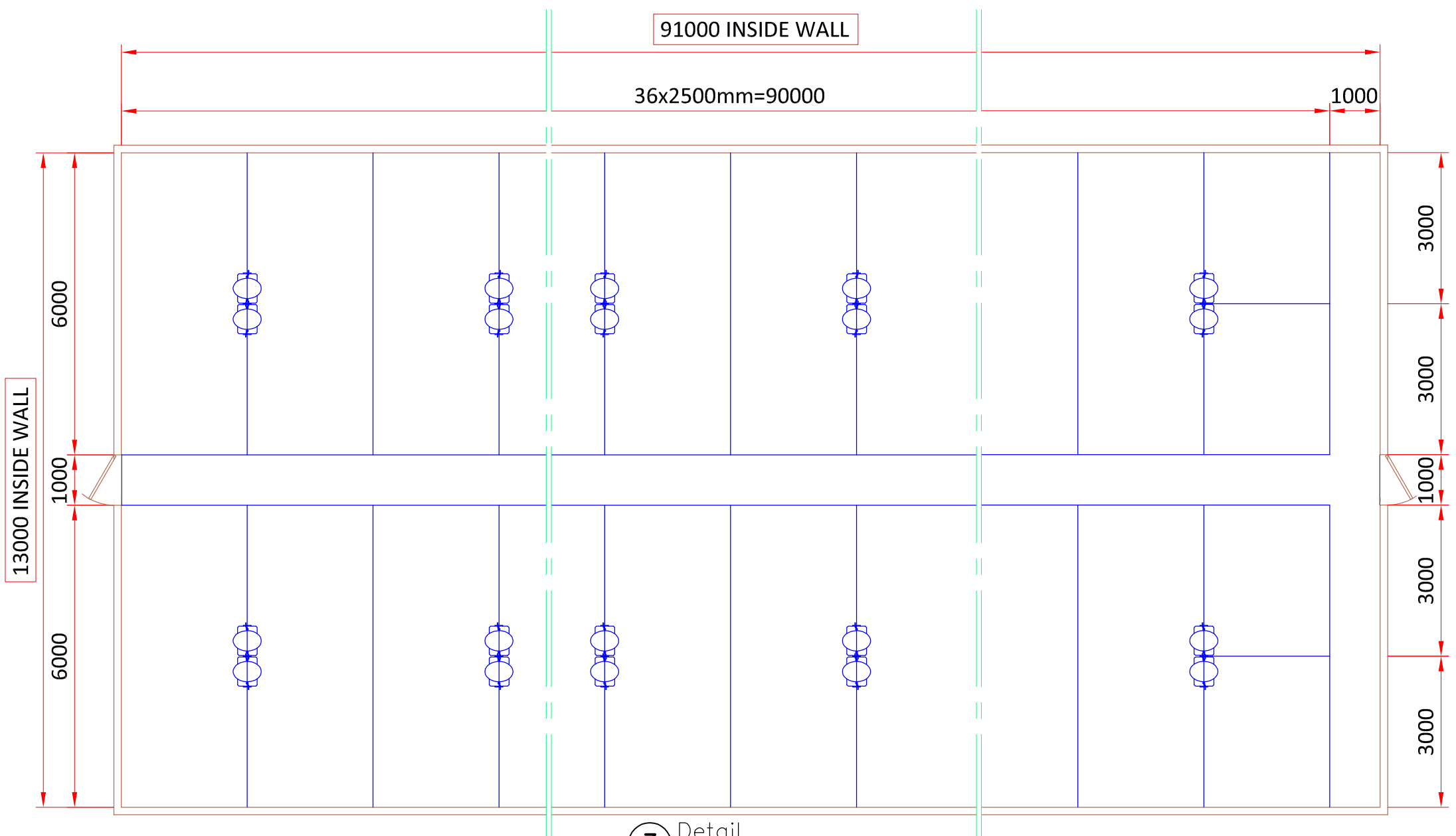
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| feed & flourmills | wet/dry feeding systems | silos | slurry systems | slats (plastic/concrete) | pig equipment | agricultural

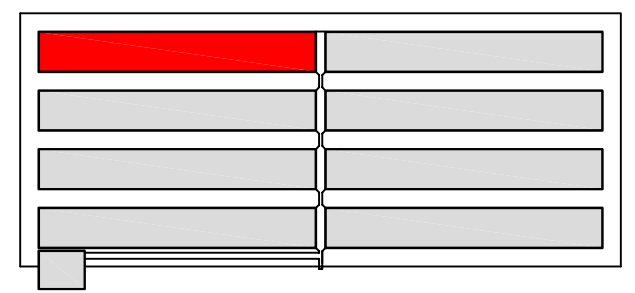
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2 Layout
scale 1:250



3 Detail
scale 1:100



1 Site 2
scale 1:~

client: 4800 sow farm
8 buildings with per building:
2 rows of 35 nursery pens 2500x6000mm and 2
special care pens of 2500x3000mm
Total 560 Nursery pens and 32 special care pens

**Layout
Nursery**

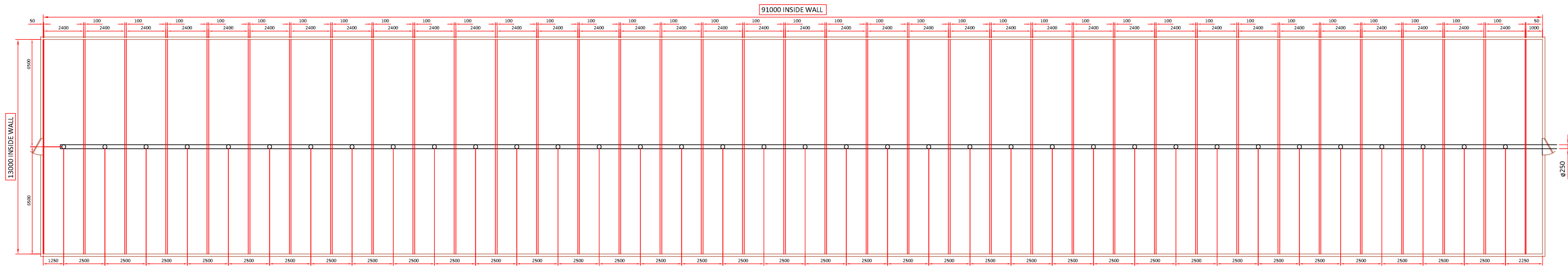
(mm) scale: 1:~ drawing: 60a
(y-m-d) date: 2016-07-04 drawn: Joost

A3

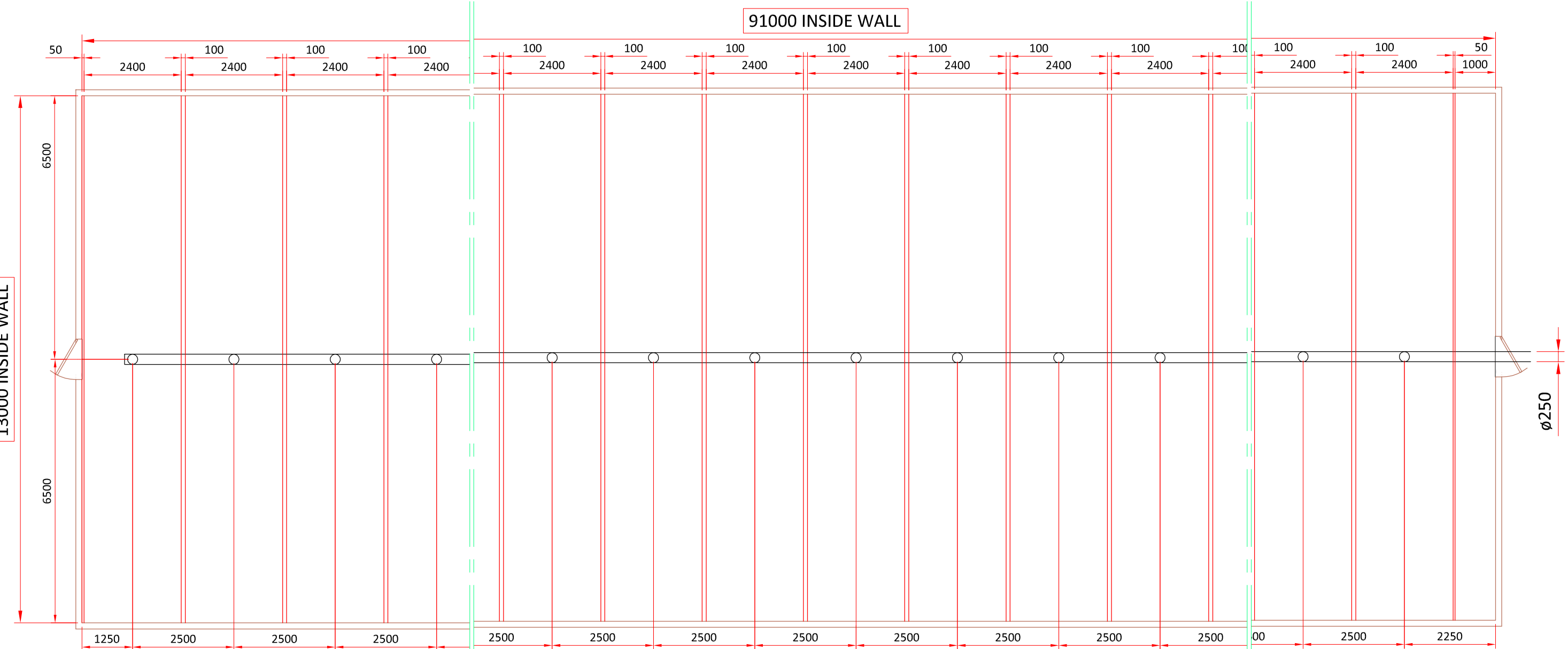


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1 Slurry
scale 1:250



3 Detail
scale 1:100

client: 4800 sow farm
8 buildings with per building:
2 rows of 35 nursery pens 2500x6000mm and 2
special care pens of 2500x3000mm
Total 560 Nursery pens and 32 special care pens

**Slurry
Nursery**
(mm) scale: 1:~
(y-m-d) date: 2016-07-04
drawing: 60b
drawn: Joost

A3

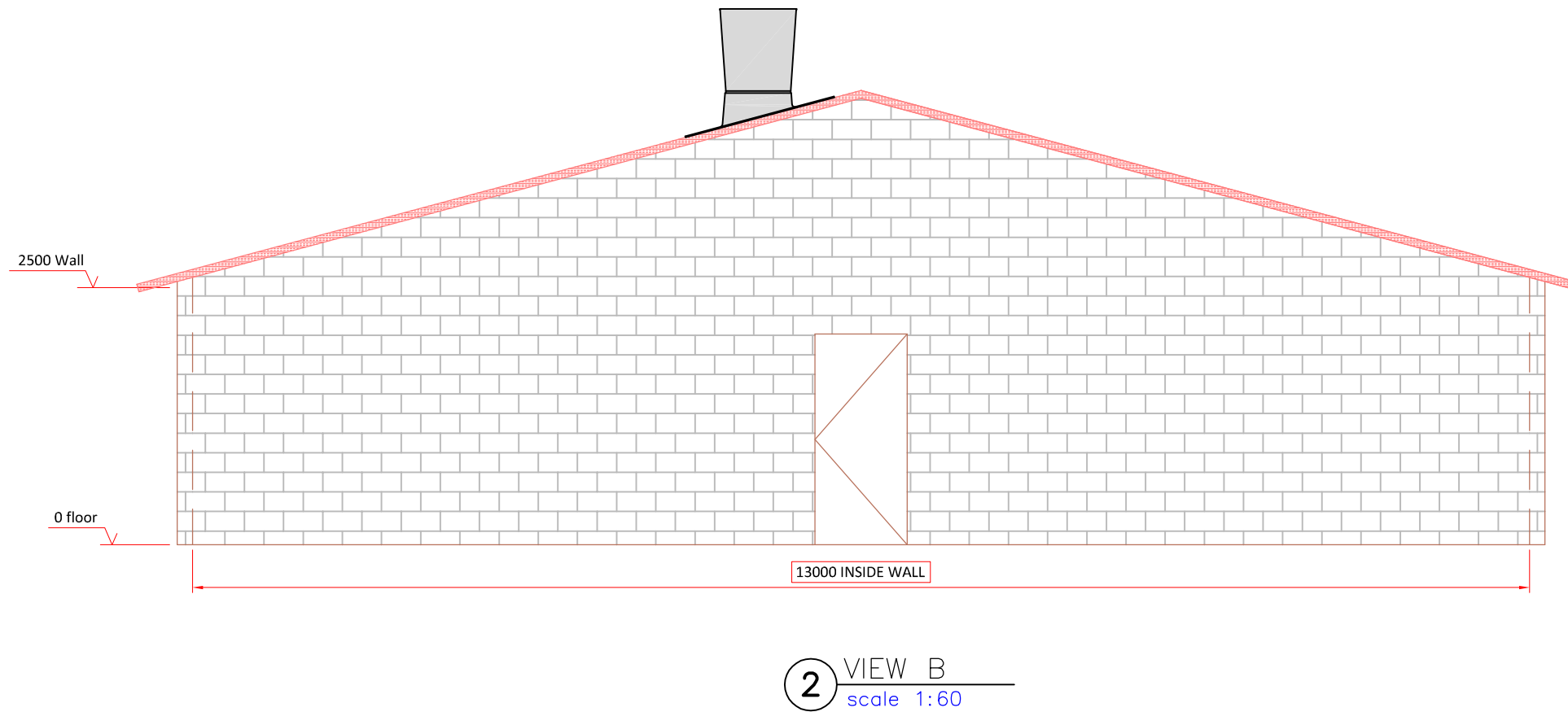
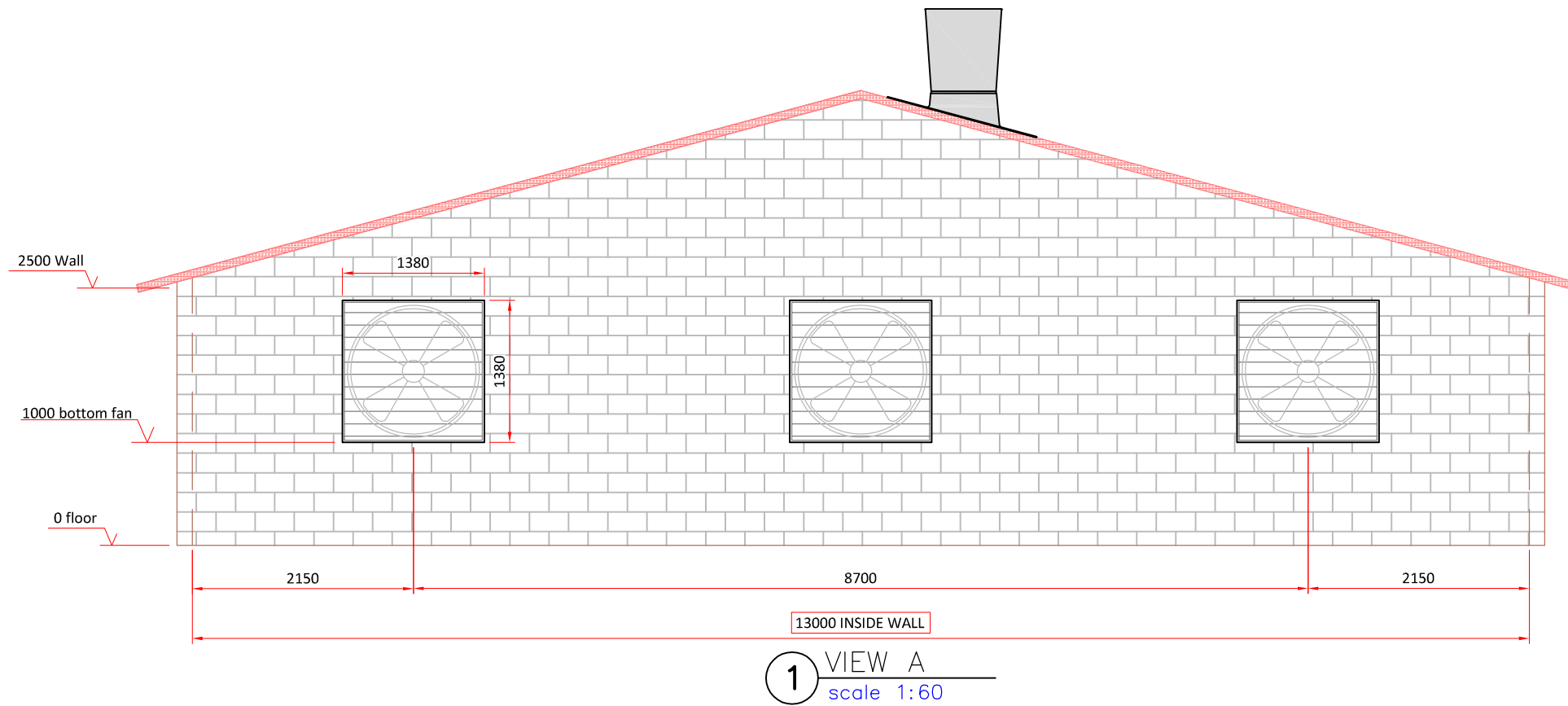
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client: 4800 sow farm
 8 buildings with per building:
 2 rows of 35 nursery pens 2500x6000mm and 2
 special care pens of 2500x3000mm
 Total 560 Nursery pens and 32 special care pens

VIEW A-B
Nursery

(mm) scale: 1:~
 (y-m-d) date: 2016-07-04

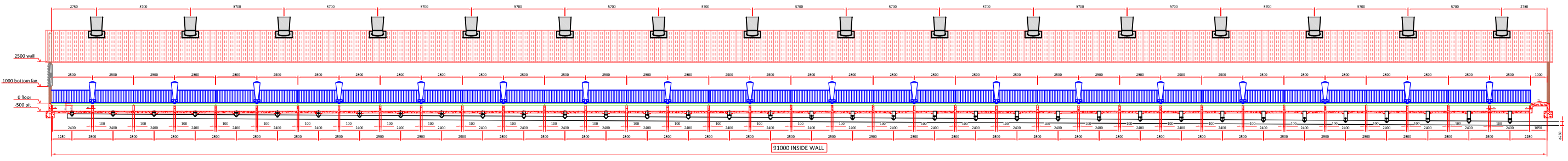
drawing: 61
 drawn: Joost

A3

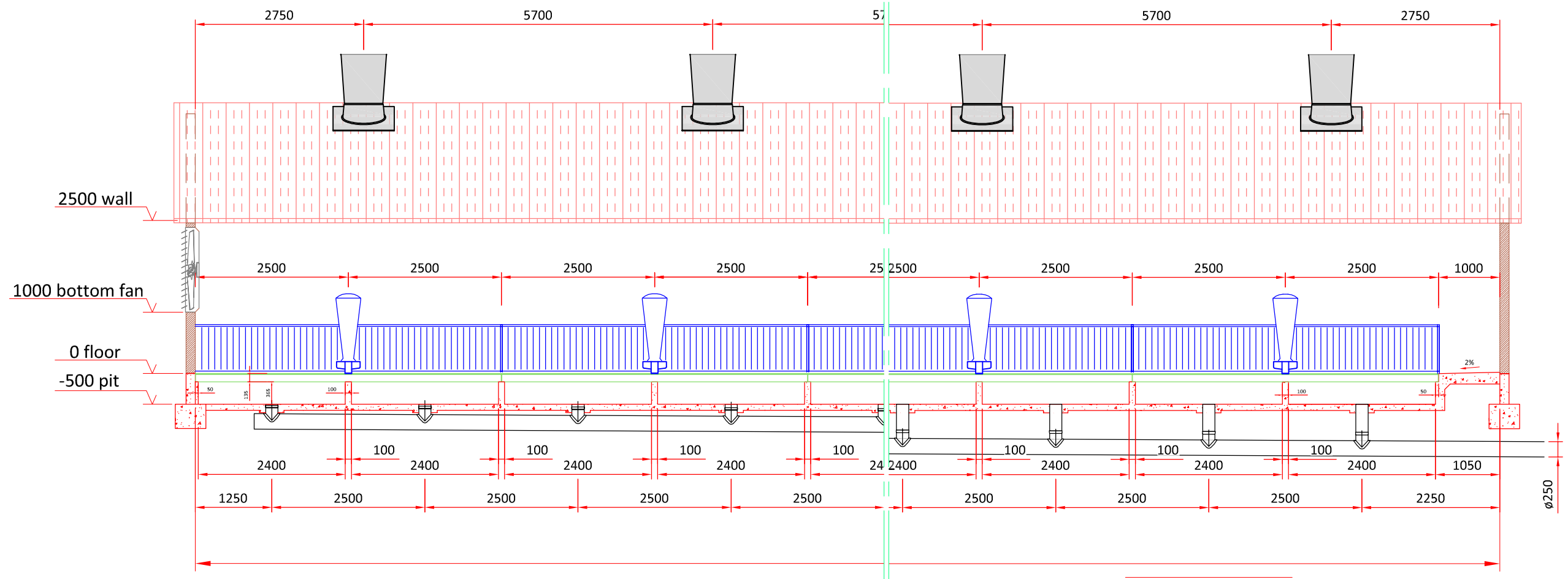
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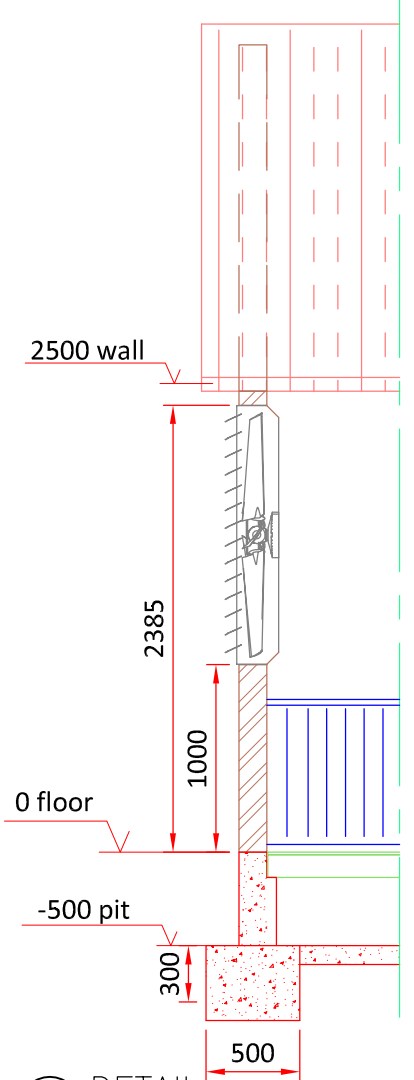
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1 VIEW C-C
scale 1:250



2 DETAIL
scale 1:75



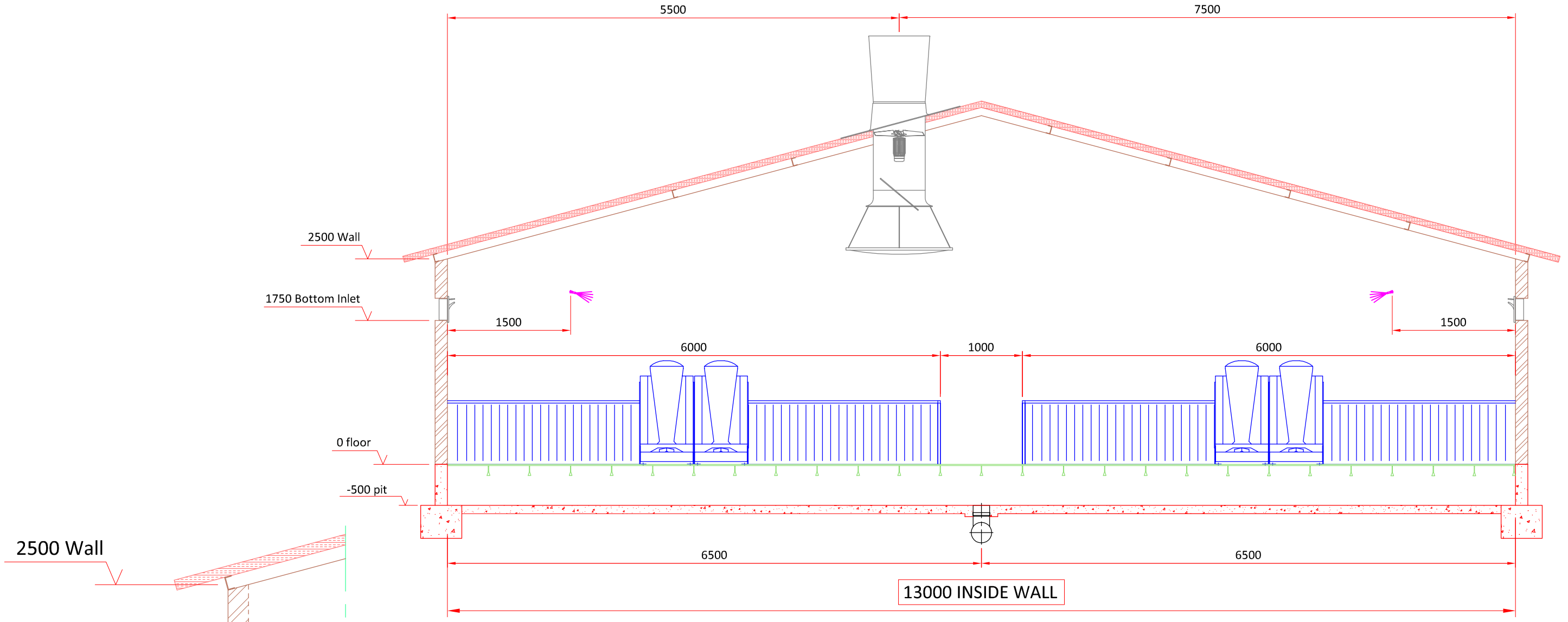
3 DETAIL
scale 1:40

client: 4800 sow farm
8 buildings with per building:
2 rows of 35 nursery pens 2500x6000mm and 2
special care pens of 2500x3000mm
Total 560 Nursery pens and 32 special care pens

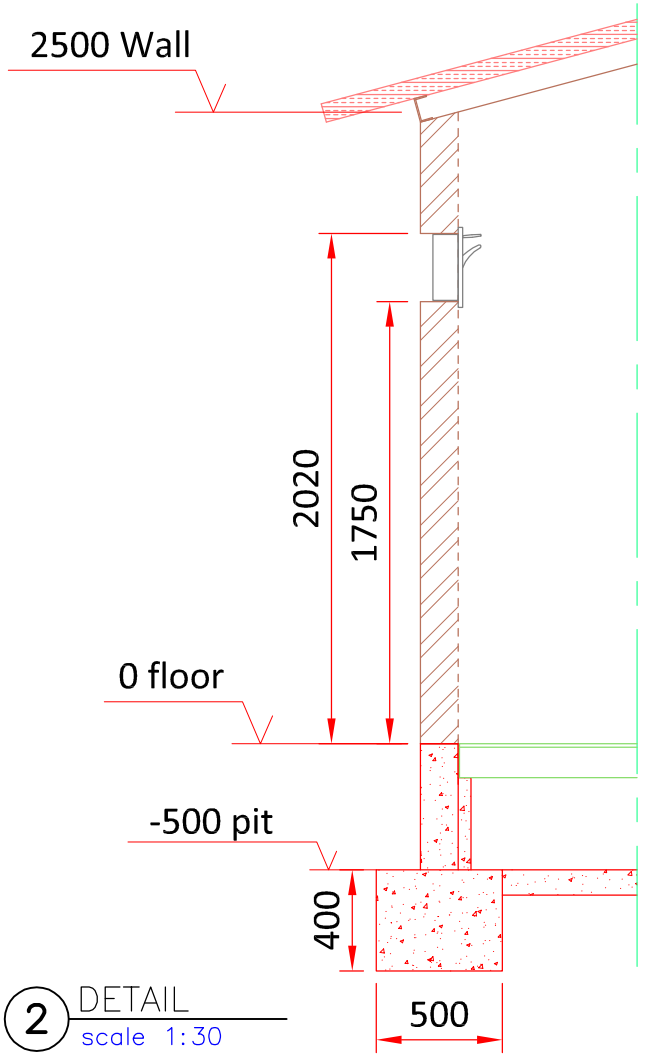
**VIEW C-C
Nursery**
(mm) scale: 1:~
(y-m-d) date: 2016-07-04
drawing: 62
drawn: Joost
A3

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1 VIEW D-D
scale 1:50



2 DETAIL
scale 1:30

client: 4800 sow farm
8 buildings with per building:
2 rows of 35 nursery pens 2500x6000mm and 2
special care pens of 2500x3000mm
Total 560 Nursery pens and 32 special care pens

VIEW D-D
Nursery

(mm) scale: 1:~ drawing: 63
(y-m-d) date: 2016-07-04 drawn: Joost

A3

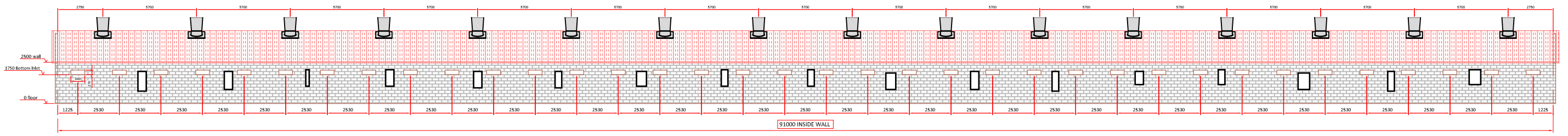
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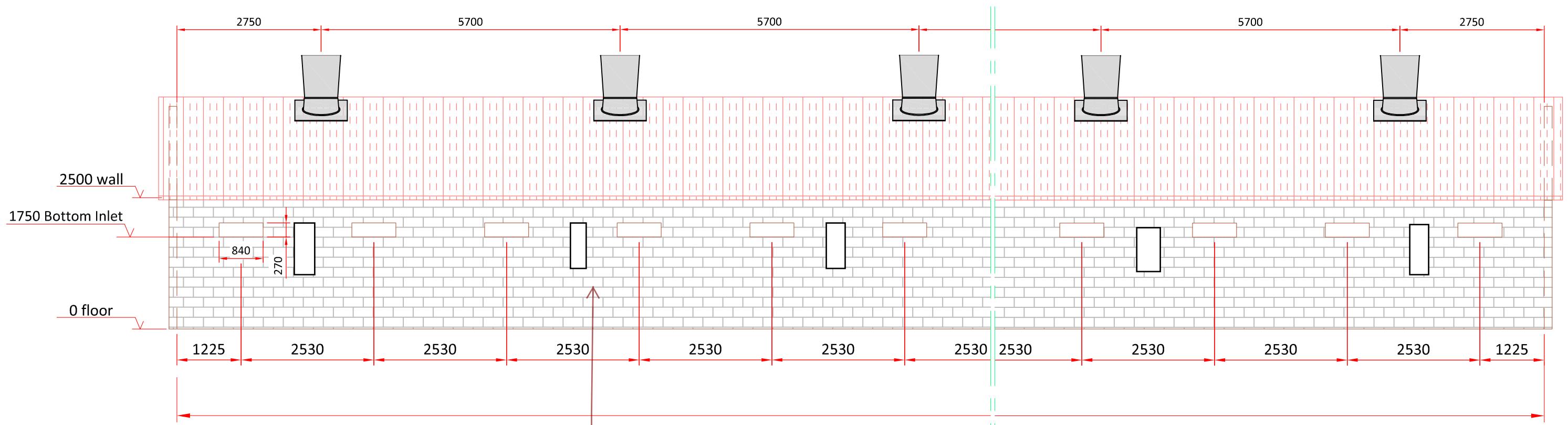
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1 VIEW E
scale 1:250



2 DETAIL
scale 1:75

client: 4800 sow farm
 8 buildings with per building:
 2 rows of 35 nursery pens 2500x6000mm and 2
 special care pens of 2500x3000mm
 Total 560 Nursery pens and 32 special care pens

VIEW E
Nursery
 (mm) scale: 1:~
 (y-m-d) date: 2016-07-04
 drawing: 64
 drawn: Joost

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