



STRUCTURAL & CIVIL ENGINEER'S REPORT

**BASIC DUE DILIGENCE REPORT ON STRUCTURAL AND CIVIL ENGINEERING
ASPECTS OF PREMISES & BUILDINGS ON ERF 19134, PAARL**

Prepared for NEXUS^{AG}, Paarl



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1. Introduction

1.1. Background

MPro Consulting Engineers have been appointed by NEXUS^{AG} to investigate and report on the Structural and Civil Engineering aspect pertaining to the premises and buildings on ERF 19134, Paarl.

The Project brief was two-fold:

- Phase 1: Feasibility for NEXUS^{AG} to conduct normal business activities on the premises, including storage of Agricultural fertilizers and chemicals, compliant with the relevant municipal legislation and national building requirements.
- Phase 2: Feasibility for the extension of the existing buildings, building new offices and providing additional storage space.

This report only deals with Phase 1.

1.2. Locality

The Industrial Site is situated within the Industrial Area of Northern Paarl, between Oosbosch Street, Distillery Street and the banks of the Bergriver, on the western side.



Figure 1: Locality Plan

1.3. Site Inspection & Assessment

Site inspections and surveys were conducted in September to November 2016. The observations and results are summarized and tabled below.

2. Site Description

2.1. Site description

The zoning is Industrial Zone with permission for industrial buildings and warehouses. The Site is accessed via an 8m wide servitude road (“pan-handle”) of 85m long from Distillery Road.

Zoning	Use	Erf	Area (m2)	Building lines
Industrial Zone	Industrial Buildings Warehouses	19134	14 653 (including servitude road)	3m on Oosbosch & Distillery streets

2.2. Topography

The site is bounded on the west by the Rem of ERF 5058 and the Berg River beyond that. On the north by Oosbosch Street and on the other boundaries by various industrial erven. The site is only accessed via the 8.0m servitude road from Distillery Street.

The site is very flat and has virtually no fall (average 0.3% form south to north) and storm water drains to the Bergriver on the western side and the storm water system on Oosbosch Street.

2.3. Flood lines

The entire site falls under the current 1:100 year flood line level (+/- 99.43 amsl), but above the 1:50 year flood line level (+/- 98.36 amsl). The municipality has indicated that the flood line study for this area is outdated though, and can only be issued for information purposes.

3. Engineering Geology

3.1. Geotechnical Investigation

A formal geotechnical investigation and Draft report was done for the premises. Refer to attached report by Leon Croukamp in **Annexure A**. The investigation determined the foundation conditions of the site for construction of new buildings and roadworks, and recommended design for these.

No water table or bedrock was encountered in any of the four test pits. A fluctuating water table can be expected at approx. 2.0m.

4. Bulk and Link Services

A plan indicating the existing Bulk services and site Link services is attached in **Annexure B**. The plan indicates the existing Sewer, Water, and Storm water infrastructure and where the premises' internal services are currently connected.

Drakenstein Municipality's planning division will have to confirm whether there is sufficient capacity in the existing system for future developments on the premises (Phase 2).

4.1. Water

The site is currently connected to the 100mm Ø AC water pipeline on Oosbosch Street. This line also have a Fire Hydrant (box in the ground, hydrant head missing) and a 20mm Ø Erf connection to the large warehouse (A). A 250mm Ø Bulk water on Distillery road is not connected.

A new 80mm Ø Bulk water meter and 110mm Ø HDPE connection (compliant with Municipal standards) was installed on this line recently and feeds to the large warehouse (A) and 2 x Fire Hydrants (stand pipes) on the eastern side of the building.

Although the system has enough capacity and pressure (> 3.0 bar), the municipality does not guarantee an adequate water supply and pressure for Fire Protection services. If a guaranteed demand and capacity is a requirement the Owner will have to provide his own on site storage and booster pumps to satisfy his needs. Refer to Fire Engineer report for recommendations.

4.2. Sewer

The site drains to the 300mm Ø Bulk sewer on Distillery road and is connected with a 150mm Ø sewer pipeline that runs along the servitude road and connects all four buildings on the site. This service will be sufficient for the current connections and future developments.

4.3. Storm Water

The site is very flat and has no natural slope from east to west, and a very flat slope (0.3%) from South to north. The site is currently drained thru a system of grid inlets and manholes to a SW outlet in the Berg river floodplain, on the west. The pipe size is a 375mm Ø, concrete pipe.

The rain water down pipes and dissipation of storm water into the SW network are in disrepair and needs to be upgraded.

4.4. Roads & Traffic

The premises is currently accessed only via a servitude road, 8m wide and 85m long from Distillery Street. An access control point exists at the bottom of the servitude road and consist of a steel sliding gate and is not motorized or remote controlled.

No additional bulk road infrastructure is required to serve the property for Phase 1.

4.5. Electrical

Refer to Electrical Engineer's report.

4.6. Internal Services

All internal services are privately owned and maintained, and seems to be intact and in good working condition. The Fire Hydrant on Oosbosch Street has been vandalized and need to be replaced. We also noticed a water leak in the vicinity of the same Hydrant which will need attention.

It is proposed that all internal services be checked for defects and cleaned by a specialist contractor, prior to occupation. (Phase 1)

4.6.1. Internal Roads & Parking areas

All trafficked roadway surfaces are currently either concrete interlocking paving, concrete paving or gravel surfaces, or a combination thereof.

- Interlocking paving = approx. 2200 m²
- Concrete paved surfaces = approx. 560m²

The concrete interlocking paving areas needs some attention in certain areas where edging has disappeared or undermined and the paving bricks are dislodged and unravelling.

The gravel hardstand surfaces shows at lot of deterioration (pot holes) and poor storm water drainage, mainly due to large truck movement (turning) and basic neglect.

5. Existing Buildings and Structures

The existing buildings and structures on the premises consist of the following items: (for reference numbers refer to Figure 1)

Ref	Description	Area (m ²)	Type of Construction
A	Large Warehouse	2052	Open Steel trusses on RC Frame (columns & beams), brickwork infill panels & cladding
B	Medium Warehouse	908	Timber trusses on RC Frame (columns & beams), brickwork infill panels
C	Small Workshop	603	Open Steel trusses on RC Frame (columns & beams), brickwork infill panels. Double storey office section
D	Dwelling House	206	Conventional pitched roof, timber trusses and brickwork
E	Communication Mast (enclosure)	120	Steel structure (mast) and equipment in fenced enclosure
F	Other (Canopies)		Various canopy roofs for parking and entrance shading

5.1. Large Warehouse (A)

The large warehouse (32m x 63mL) is currently divided into 3 x sections:

- Southern section = 1030 m² open floor area
- Northern section = 1020 m², divided down the middle, forming 2 x 510 m² open floor spaces, with some drywall offices and ablutions on each side

The building structure consists of a RC Frame (RC Columns and Beams), supporting open steel trusses (pitched roof) on both sides and at midspan (16m).

The roof is a Bigsix-profile Asbestos sheeting, with asbestos gutters and down pipes (couple of translucent sheets in between).

The orientation of the roof slopes are east-west facing. This makes the installation of solar panels not an effective option.

Side walls consists of 230mm brick infill panels and IBR galvanized cladding (50 /50) alternatively spaced. Brickwork all round to minimum 2.4m height.

Concrete floor slabs on the ground is on average 150mm thick, with saw-cut and construction joints at 4-5m centers throughout. The floors are in good condition, and barring a couple of edge breaks and corner breaks, can be used as is.

The Finished Floor level = 98.600. (above 1:50 year flood line)

5.2. Medium Warehouse (B)

The medium warehouse (29 x 31mL) is situated on the right when entering the gate.

The building structure is a RC Frame (RC Columns and Beams), supporting open Timber trusses (3 x pitched roofs) over the length of the building, supported on 2 x RC beams in the centers.

The roof is Bigsix profile Asbestos sheeting, with asbestos gutters and down pipes.

The orientation of the roof slopes are north-south facing. This make the installation of solar panels an effective option, though only on 3 of the slopes (approx. 450m²).

Side walls consists of 230mm brick infill panels.

Concrete floor slabs on the ground is on average 150mm thick, with saw-cut and construction joints at 4-5m centers throughout. The floors are in good condition and can be used as is.

The Finished Floor level = 98.400. (above 1:50 year flood line)

A raised floor section of approx. 250mm high (like a speed bump) in the doorway provides “freeboard” against the risk of flooding in a 1:50 year event (98.36 amsl)

5.3. Small Workshop (C)

The small workshop (16.6 x 32mL) is situated straight ahead when entering the gate.

The building structure is a RC Frame (RC Columns and Beams), supporting open Steel trusses (2 x mono-pitched roofs) over the length of the building, supported on a RC beam in the center.

The roof is IBR Galvanized sheeting, with galvanized gutters and down pipes.

The orientation of the roof slopes are west-facing. This make the installation of solar panels not an effective option.

Side walls consists of 230mm brick infill panels to full height. The building has double storey over a section of 80m² and features offices and ablutions

A concrete floor slabs on the ground is on average 150mm thick, at varying levels.

The Finished Floor level = 98.680. (above 1:50 year flood line)

5.4. Dwelling House (D)

The dwelling house in the North-western corner of the property was not investigate for this report, although we did notice that it is occupied at the moment and used for offices.

5.5. Concrete Floors investigation

Concrete cores (75mm \varnothing) have been taken in all the buildings (except the dwelling house) and indicate an average thickness of 161mm. Only one core has evidence of reinforcing mesh (8mm) in the bottom of the floor.

The 120mm thick core was found in the large warehouse, but since the cores are on average above 150mm, it can be assumed that this is an outlier.



Photo 1: Concrete cores from floor slabs on the ground.

5.6. Boundary Walls, Fences & Gates

We have noted that the existing boundary wall of the premises has been erected more or less on the cadastral boundary of Rem. Erf 5058 (the property between Erf 19134 and the Berg river).

The existing boundary walls and fences consist of the following:

Boundary	Length (m)	Type of Construction	Bordering:
North	38m	1.8m Vibracrete wall + Elec. Top wires	Oosbosch street reserve
	47m	Open – No fence/wall	Oosbosch street reserve
	50m	1.5m Vibracrete wall + Razor wire	Erf 12614 (Akura)
South	25m	1.5m Vibracrete wall + Elec. Fence	Erf 5058
	45m	Existing building & Brick wall with Razor wire	Erf 19140
	30m	1.5m Vibracrete wall/brick wall + Razor wire	Erf 19139
West	165m	1.5m Vibracrete wall + Elec. Fence	Berg River banks
East	49m	1.8m Beta Fence + Elec. Top wires	Erf 12614 (Akura)
	49m	Existing building & Fence	Erf 19136

No information available on the condition of the Electric fencing and if operational.

The Vibracrete walls are old, very dilapidated in some places and in various stages of disrepair. These will need attention and repairs prior to occupation, if security is of the essence.

6. Conclusions & Recommendations

From the above investigation, surveys and visual inspections we conclude as follow and give some recommendations for upgrading and repairs required for the Utilization of the premises and buildings for Nexus normal activities of Agricultural storage and warehousing:

6.1. Buildings

In our opinion the buildings are all in a fairly good condition to be utilized as they stand with some improvements in certain areas listed below:

6.1.1. Solar panel installation

- The orientation of the majority of the roof slopes are not ideal for solar panel installation, except Warehouse B (approx. 450m² north facing slopes)
- The Asbestos roof sheeting will have to be removed, spoiled by an approved contractor and replaced, if solar panels installation should be considered. (approx. 900m² on B)
- Timber Roof trusses will have to be investigated by Engineer for sufficient capacity for additional loading.

6.1.2. Concrete Floors

- The concrete floors in all the buildings are in a fair condition and can be used without restrictions.
- Edge breaks and corner breaks are visible in some locations and should be repaired to avoid further deterioration due to small, hard wheel loads and forklifts.
- A full assessment of the floor and the true extent of all the defects can only be fully assessed once the storage areas have been cleared.
- The Ground Floor in the small workshop is at different and varying levels. This should be addressed with a 150mm thick, 30 MPa concrete overlay, should the building be used for warehousing and storage with forklift traffic. Approx. 600m². The unit cost of an overlay is approx. R 380/m², including joint cutting and sealing.

6.1.3. General

- The damaged timber roof truss in Building B need to be repaired in-situ, with replacement of missing and/or damaged members. (See photo attached)
- We would also recommend as a general and ongoing maintenance issue the overall cleaning, waterproofing, repair and painting of the buildings prior to occupation.

6.2. Services

The existing services are all in use and serves the current operations to some extent. We recommend the following to be done prior to occupation:

6.2.1. Water / Fire water

- Replace missing Fire Hydrant on Oosbosch Street with new Standpipe Hydrant installation.

- Install new additional 80mm Fire Hydrant near small workshop (C), at 90m apart, as per Fire Engineer's report.

6.2.2. Storm water

- Install 2 x additional, heavy duty, SW grid inlets (600 x 450mm) on hard stand and trafficked areas, and connect to exiting SW system with 225mm Ø concrete pipe.
- Repair and Connect rain water down pipes, via gulley grid inlets to existing SW system to dissipate storm water effectively

6.2.3. Roads & Trafficked areas

- Allow for the rework, levelling and compaction of approx. 4500 m² of gravel hard stand, circulation area and roads, to receive new wearing course.
- Import, level and compact new wearing course (G4 laterite, or similar), 150mm thick, approx. 3000 m²
- Interlocking paving – to be repaired (approx. 50m²) and additional paving added (approx. 50m²). Repair and replace approx. 80m concrete edging to block paving areas.

6.2.4. Cleaning of Services

- Allow for the inspection and cleaning of all internal services by a specialist contractor, prior to occupation.

6.3. Boundary Fences & Walls

- Erect a new 1.8m Beta security fence, with electrified fencing top wires on the open boundary on Oosbosch Street, approx. 48m long (to match fence on east boundary)
- General maintenance and repairs, which might include replacement of sections of Vibracrete walls and electrified fencing on the western and southern boundaries. A separate assessment by a Specialist installer should be made of the fences and walls.

6.4. General

The following items are listed for general consideration and action:

- Entrance Gate – Motorization and remote control of sliding gate at entrance

We trust that this report meets with your approval and has addressed all your requirements, should you need any more information or have further queries, it can be direct to MPro Consulting Engineers.

MPro CONSULTING ENGINEERS



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**ANNEXURE A:
Geotechnical Investigation**

**Geotechnical investigation for NexusAG, Erf 19134, Paarl,
Western Cape**

On behalf of MPro Consulting

By

Leon Croukamp (Pr.Sci.Nat)
GeoCroukamp

November 2016

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1. Introduction

1.1 Background

GeoCroukamp had been contracted by MPro Consulting to undertake a geotechnical investigation at the property known as NexusAG, Erf 19134, Paarl. The farm is located in the industrial area of Paarl and is currently used as a warehouse and the aim of the investigation is to give insight into the suitability of the site for more warehouses and roads.

1.2 Physiography

The site is located at 33 42' 58.60" S and 18 58' 24.77" E. The property is known as Erf 19134, Paarl and is shown in Figure 1.

The site under investigation is flat and is situated directly adjacent to the Berg river on the floodplain of the river.

The site falls in the winter rainfall area of the country and chemical weathering is the dominant mode of weathering. A shallow water table can occur.



Figure 1: Google Earth image of site locality with test pit locations

2 Geotechnical Investigation

2.1 Methodology

Site inspection was done to determine potential positions of outcrop, drainage channels and other information of a geotechnical nature.

No rock outcrop was found on site and in the surrounding vicinity.

2.2 Test Results

2.2.1 Test Pits

Four test pits had been excavated and profiled by L Croukamp and the positions is shown in figure 1.

A typical profile for the test pits is shown below:

0.45m: Slightly moist, brown with orange mottles, dense, Fill material consisting of mostly building rubble.

0.6m: Slightly moist light grey, loose, intact, silty Sand. Alluvium (elluviated layer)

0.9m: Slightly moist, dark brown, medium dense-stiff, sandy Clay with silt. Alluvium.

2.0m: Slightly moist to moist, brown grading to orange, medium dense to loose, silty Sand with clay. Alluvium.

Figure 2 show the profile for NX3

No water was encountered in the test pits but pit NX4 showed indications of a fluctuating water table at approximately 2.0m.

No bedrock was encountered in any of the test pits.

Samples were taken for future laboratory analysis.

The material found in the test pits consist mostly of loose sandy material which could cause sidewall instability. Care should be taken during excavations regarding the safety of workers as stipulated by Health and Safety regulations.

The test pits were entered by a qualified engineer and described according to the industry standard namely the MCCSSO system as proposed by Jennings, et al. (1973)



Figure 2: NX3 soil profile

DCP profiles had been made as well to determine the suitability of the material for the proposed development.

2.2.2 Foundation

The main aim of the visit on 10 November 2016 was to determine the foundation conditions of the site for the purpose of construction of warehouses and service roads.

2.3 Conclusions

- A geotechnical investigation was done on 10 November 2016 on Erf 19134, Paarl.
- The soil profiles and DCP tests indicate a relatively stiff layer from surface to approximately 0.45m.
- Furthermore the soil profiles showed loose material exceeding a depth of 3m.
- The water table was not encountered in any of the test pits but NX4 indicated a fluctuating water table at approximately 2m depth.
- Sidewall stability should be carefully monitored and all safety precautions adhered to.

2.4 Recommendations

- It is recommended that development continue.
- It is recommended that if possible the foundations and roads be designed to utilize the stiff material in the upper part of the profile.
- Should foundations be constructed deeper than 0.4m it is recommended that a stiffened raft foundation be used since the material is loose and some settlement is expected. No bedrock was encountered in the profile to utilize as foundation for short piles.
- Based on the observed DCP results and the existing paving on site it is indicated that segmented paving material will be suitable for use on the site. It is recommended that paving bricks with a saw-tooth shape be used and that a 25mm bedding layer be constructed after levelling of the area before placement of the bricks.

2.5 Bibliography

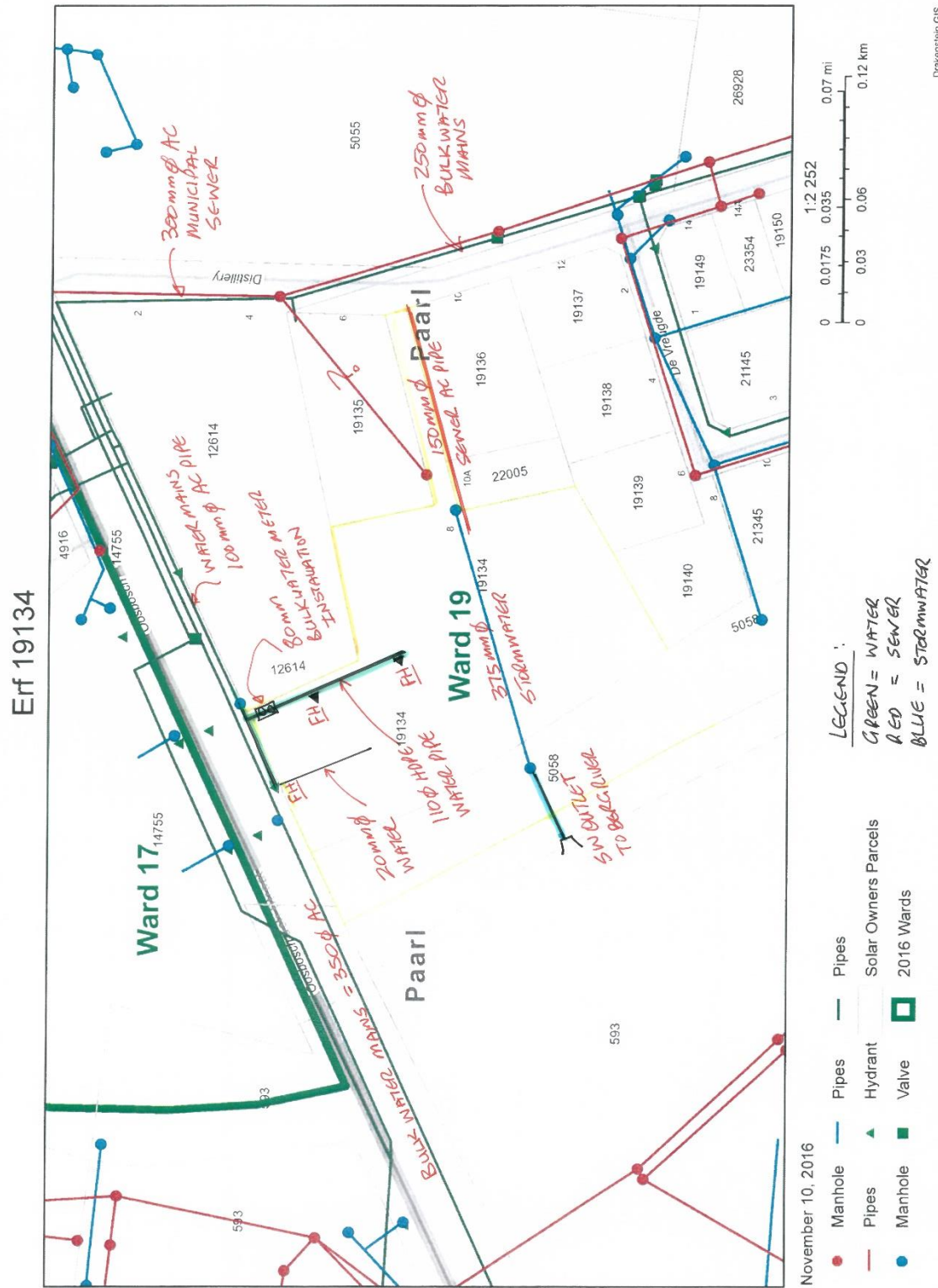
Jennings, J.E. *et al*, 1973: "Revised guide to soil profiling for civil engineering purposes in Southern Africa: The Civil Engineer, South Africa, January 1973



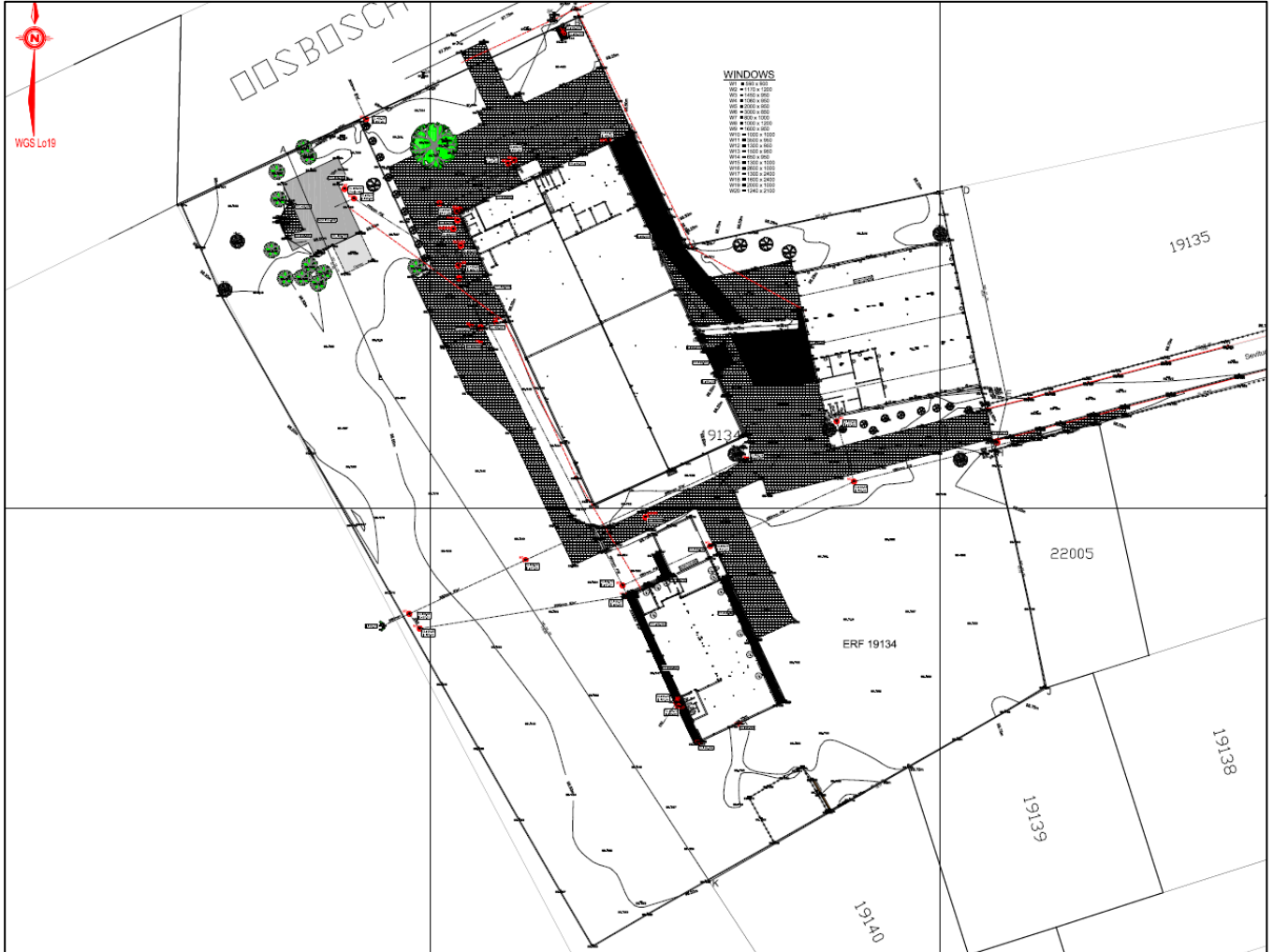
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ANNEXURE B: GIS - Bulk Services & Link Services



ANNEXURE C: Site Survey Plan – incl. Contours



PAARL :
Erf 19134
Topo - & Detail Survey

ANNEXURE D: Site Photos



Photo 1: Damaged timber truss in Warehouse B



Photo 2: Internal Warehouse A – RC Frame & Steel trusses



Photo 3: Internal Warehouse A – dividing wall



Photo 4: Internal Warehouse B – RC Frame



Photo 5: Warehouse Floor B - notice edge breaks