

Date: 15 August 2022
Job No: 64308#ID-01

PROJECT KEA – REVIEW OF ELECTRICAL SAFE DISTANCES

Background:

Project KEA proposes to construct an Energy from Waste (“Efw”) Plant on a circa 15ha site on the corner of Morven-Glenavy Road, Waimate, New Zealand.

The construction includes numerous buildings and facilities including a large main building (circa 52.5m high) and an exhaust stack (circa 75m high).

On the opposite side of Morven-Glenavy Road runs a Transpower transmission line.

Purpose of this Review:

Confirmation is required that the proposed Efw construction activities and final built elements comply with the relevant minimum separation distances stipulated in the *New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34:2001)*.

Assessment of critical Efw elements with respect to Electrical Safe Distance.

A proposed site layout of the Efw Plant has been developed. This is shown in **Appendix 1**.

The Efw elements of most significance regarding proximity to the Transpower transmission line is:

Element	Distance INSIDE Efw Boundary
Main Stack (75m in Height)	11m
Cooling Towers	5.5m
Ancillary Buildings	11m



Architecture
Planning
Industrial Development
Building Surveying
Structural Engineering
Building Services
Engineering
Project Management

Process & Mechanical
Engineering Environmental
Sustainability
Ecology
Land Surveying
Civil Engineering
Infrastructure Engineering
Geotechnical Engineering

Babbage Consultants Limited
Level 4, 68 Beach Road, Auckland 1010
PO Box 2027, Shortland Street, Auckland 1140,
New Zealand
T 09 379 9980 F 09 377 1170
E admin@babbage.co.nz
W www.babbage.co.nz

Transpower Line:

The details of the Transpower line of relevance are:

Line	Glenavy-Timaru A (GNY-TIM-A)
Voltage	110kV
Poles	Single Pole – Single Circuit (items 0454 to 0456)
Distance between Poles	150m
Distance of Pole centre outside EfW boundary	17m
Distance of conductor beyond centre line of pole	1.5m (estimate)

Refer site photograph in Appendix 2 which shows Morven-Glenavy Road looking North with Transpower transmission line on the right of the road and the EfW site on the left of the road.

Minimum Distances Stipulated in NZECP 34:2001:

Section 2: Minimum safe distances for excavation and construction

cl 2.2 Excavation near overhead electric line supports.

Stipulates controls around excavations within 12m of pole. No specific controls beyond 12m.

cl. 2.4 Construction of Buildings and similar structures near overhead electric line supports

Table 1 (Appendix 3) stipulates minimum distance between constructing buildings and poles supporting lines exceeding 66kV of 8m.

Section 3: Safe distance requirements between conductors and buildings

cl 3.2.1.1 and Table 2 (attached in Appendix 4)

Table 2 does not specifically address a span of 150m therefore the next greatest span of 250m is used as a conservative model.

In accordance with Table 2, lines exceeding 33kV but not exceeding 110kV with a span of 250m requires a minimum distance to the side of the conductor of 12.5m

Conclusion:

Construction:

All excavation and construction works are within the EfW Plant site boundary and the boundary is 17m from the transmission line poles.

The minimum distance stipulated by NZECP 34:2001 for excavation is 12m and for construction is 8m.

Buildings:

The distance between the EfW element closest to the EfW boundary (cooling tower) and the nearest conductor on the GNY-TIM-A line is: $5.5+17-1.5 = 21\text{m}$.

The minimum distance stipulated by NZECP 34:2001 - Table 2 is: 12.5m.

Therefore, with respect to both construction and final built elements, the proposed EfW Plant complies with NZECP 34:2001.



Paul Duder

Babbage Consultants Ltd - Principal

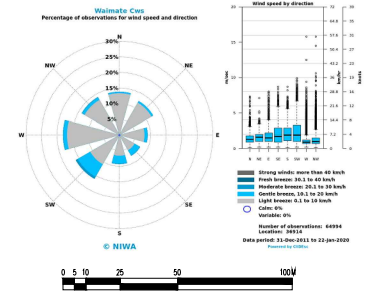
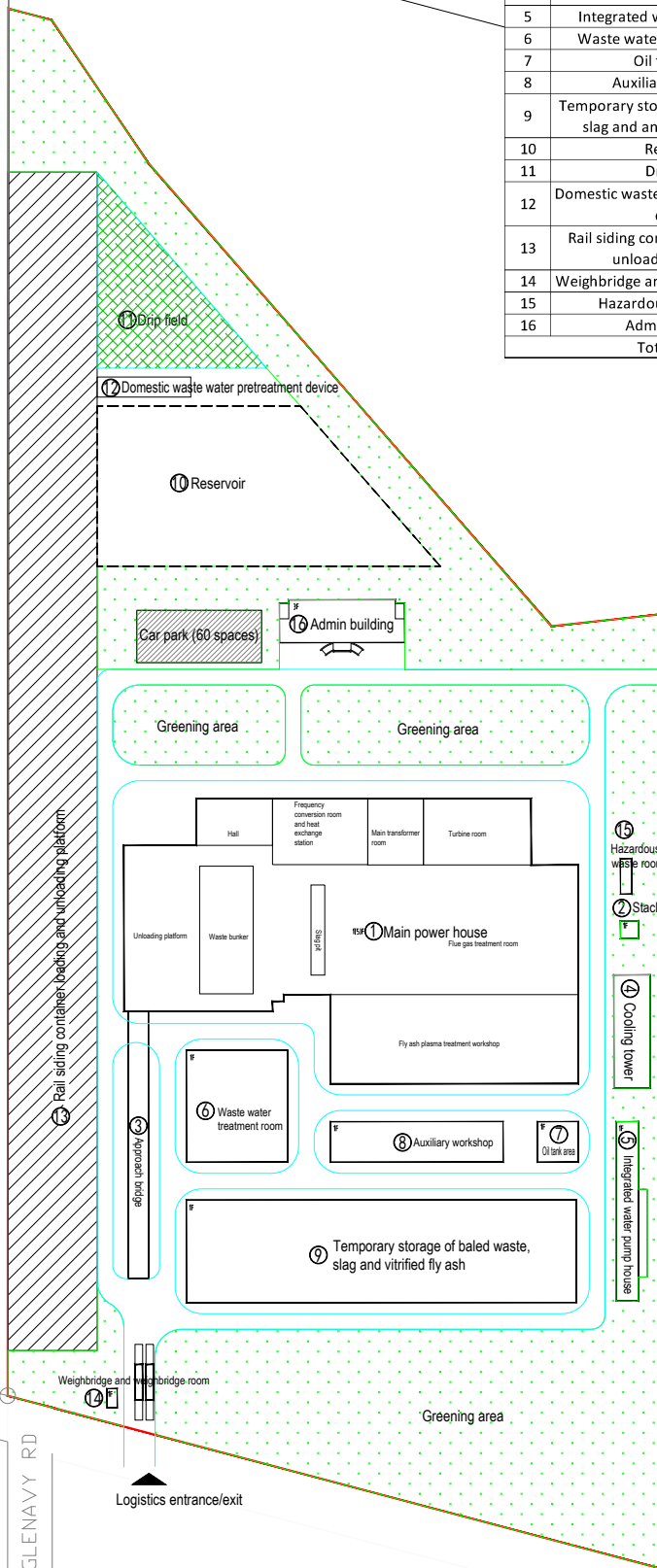
Appendix A Site Layout

List of buildings and structures

No.	Name	Land area	Building area	Floor area	Height (m)	Floors (F)
1	Main power house	20560	37008	43176	48.5	1 (5)
2	Stack	65	-	-	80.5	-
3	Approach bridge	1100	-	-	7.3	1
4	Cooling tower	850	-	-	9.3	1
5	Integrated water pump room	980	810	810	6.5	1
6	Waste water treatment room	2250	2250	2250	6.5	1
7	Oil tank area	350	40	40	4.5	1
8	Auxiliary workshop	1410	1410	2820	17.5	1
9	Temporary storage of baled waste, slag and and vitrified fly ash	8000	8000	8000	12.0	1
10	Reservoir	8000	-	-	-4.5	-1
11	Drip field	3000	-	-	-	-
12	Domestic waste water pretreatment device	340	-	-	-	-
13	Rail siding container loading and unloading platform	21200	-	-	-	-
14	Weighbridge and weighbridge room	300	40	40	4.5	1
15	Hazardous waste room	80	80	80	6.5	1
16	Admin building	1100	3300	3300	14.5	3
Total		69585	52938	60516		

Main technical-economic indicators

No.	Name	Unit	Value	Remark
1	Total land area of plant	m ²	147627	
2	Land area of buildings (structures)	m ²	69585	
3	Total building area	m ²	52938	
4	Coefficient of building occupation	%	47.1	
5	Floor area ratio	-	0.41	
6	Green area ratio	%	35	



CB23F/105
83.2ha

Appendix B Site Photograph

Appendix 2 Site Photograph



Appendix C NZECP 34-2001 Table 1

materials shall not be constructed within 5 m of any tower or conductive pole of a high voltage overhead electric line of 66 kV or greater. As part of the consent, the overhead electric line owner may prescribe the design of any such fence to be constructed within this 5 m distance.

- 2.3.4 Where the construction of an overhead electric line would cause a contravention of the principles of clause 2.3.3, the line owner shall, at the line owner's cost, carry out an engineering study and undertake such remedial work as is necessary to maintain electrical safety.
- 2.3.5 Figures 1 and 2 provide a quick reference to the minimum safe distances for installation/construction of conductive fences near overhead electric line supports.

2.4 CONSTRUCTION OF BUILDINGS AND SIMILAR STRUCTURES NEAR OVERHEAD ELECTRIC LINE SUPPORTS

- 2.4.1 Except with the prior written consent of the overhead electric line owner, no building or similar structure shall be erected closer to a high voltage overhead electric line support structure than the distances specified in Table 1. The distances in Table 1 are to be measured from the closest visible edge of the overhead electric line support foundation, and the nearest part of the outermost part of the building. Refer to section 3 of this code for minimum safe distances between buildings (and other structures) and conductors.

TABLE 1 MINIMUM SAFE DISTANCES BETWEEN BUILDINGS AND OVERHEAD ELECTRIC LINE SUPPORT STRUCTURES

Circuit Voltage	Pole	Tower (pylon)
11 kV to 33 kV	2 m	6 m
Exceeding 33 kV to 66 kV	6 m	9 m
Exceeding 66 kV	8 m	12 m

- 2.4.2 Figures 1 and 2 provide a quick reference to the minimum safe distance requirements for the construction of buildings and other structures near overhead electric line supports.

Appendix D NZECP 34-2001 – Table 2

necessary engineering study being borne by the line owner.

3.3 SAFE DISTANCES FROM CONDUCTORS WITHOUT ENGINEERING ADVICE

3.3.1 Table 2 sets out the safe distances from conductors under normal conditions without engineering advice for conductor spans up to 375 m with supporting structures at equal elevation.

TABLE 2 SAFE DISTANCES FROM CONDUCTORS WITHOUT ENGINEERING ADVICE

Circuit voltage	Maximum span length (m)	Minimum distance beneath conductors under normal conditions (m)	Minimum distance to the side of conductors under normal conditions (m)
Not exceeding 1 kV	50	4	3.5
Exceeding 1 kV but not exceeding 11kV	80	5.5	5
Exceeding 11 kV but not exceeding 33 kV	125	7	8.5
Exceeding 33 kV but not exceeding 110 kV	125	7.5	9.5
Exceeding 110 kV but not exceeding 220 kV	125	8.5	11
275 kV d.c. & 350 kV d.c.	125	8.5	7.5
Not exceeding 33 kV	250	8	12
Exceeding 33 kV but not exceeding 110 kV	250	8.5	12.5
Exceeding 110 kV but not exceeding 220 kV	250	10	14
275 kV d.c. & 350 kV d.c.	250	10	11
Not exceeding 33 kV	375	9.5	20.5
Exceeding 33 kV but not exceeding 110 kV	375	10	21
Exceeding 110 kV but not exceeding 220 kV	375	11	22.5
275 kV d.c. & 350 kV d.c.	375	10.5	18
For all other spans		Engineering advice required	

(voltages are a.c. except where specified as d.c.)

NOTES

- Observance of potential conductor motion is required to ensure safe distances during construction.
- Where supporting structures are not located on equal elevations, a specific engineering study may be required to ensure distances are in accordance with Table 3.