City of Fairhope
Board of Adjustment and Appeals
5:00 PM
City Council Chambers
May 17, 2021

1. Call to Order

2. Approval of Minutes
   - April 19, 2021

3. Consideration of Agenda Items:

   A. BOA 21.07 Public hearing to consider the request of Fairhope Public Utilities for a Special Exception to allow a Public Utility for property located at 8300 Morphy Avenue. **PPIN #: 108954**

4. Old/New Business

5. Adjourn

The Board of Adjustment met Monday, April 19th at 5:00 PM at the City Municipal Complex, 161 N. Section Street in the Council Chambers.

Present: Anil Vira, Chairperson; Richard Schneider; Cathy Slagle Christina Stankoski; Hunter Simmons, Planning and Zoning; Samara Wiley, City Planner; Kim Burmeister, Planning and Zoning (minutes);
Alternates on standby: David Martin, Donna Cook

Chairman Vira called the meeting to order at 5:05 PM.

Minutes: There were no minutes for approval

BOA 21.03 Public hearing to consider the request of MGC, LLC, dba Sportsman Marine and Outdoor, for a Special Exception to allow Outdoor Sales for property located at 306 De La Mare Avenue (zoned B-2), PPIN# 14358

Hunter: In B-2 outdoor sales are only allowed on appeal. Zoning reference: *Article III, Section B., Table 3-1 Use Table.*

The applicant is seeking an appeal which will allow golf carts to be located outside the building in the gated courtyard abutting De La Mare. The shop is being advertised as a "boutique" dealership which will be selling and renting high end LSV's. A schematic was presented for representation, showing seven (7) golf carts outside. The similar golf cart business at Morphy and Section was cited as a good visual example of the intended business.

Staff recommends approval with condition:

1. Revise the site plan to identify where the outdoor sales area as well as specifically state the items that will be located outside and available for purchase.

Applicant Hank Miner spoke and answered general questions on access and egress and anticipated traffic. Loading and delivery operations will be done in the back of property. Staff, not customers or delivery agents, will operate golf carts being brought onto and off site. Sidewalk will not be used for travel and will not be blocked. He intends to run a clean and viable business.

Dick is concerned about customers test driving the carts and the danger this could pose to street safety. He also wanted to make sure there would be no golf cart activity on sidewalks.

Hunter said traffic will be heavily policed.

Christina noted there is a lot of traffic on De La Mare already, and it is a concern. There is also a lot of pedestrian traffic on the sidewalk.

Cathy asked about Bernhardt Lane, the side street. Hunter said Bernhardt Lane is a one way private lane used to exit the community park parking lot.

Cathy asked if this would be a sales and service site. Mr. Miner said sales only, no service.

There were no public comments.

Dick made a motion to accept staff's recommendation of approval as presented with condition:

1. Revise the site plan to identify where the outdoor sales area as well as specifically state the items that will be located outside and available for purchase.

John 2nd the motion. Unanimously passed.

Votes to accept staff's approval to recommend approval:
Anil Vira: Aye
Cathy Slagle: Aye
Dick Schneider: Aye
Christina Stankoski: Aye
John Avent: Aye

Motion passed unanimously

BOA 20.05 TABLED

BOA 21.06 Public hearing to consider the request of FST Provision Investments, LLC, for a Parking Variance for property located at 9979 Windmill Road (zoned B-4), PPIN# 77607

Samara: The applicant is requesting a parking variance from the maximum allowable parking, the compact parking requirement and the requirement that all parking over the required amount be pervious. She referenced the Zoning Ordinance, *Article VI, Section E. 2. Table 4-3 – Parking Schedule.* The site plan provide by applicant shows two commercial buildings at 3,022 s. f. each. Total required parking as per the Zoning Ordinance would be 22 parking spaces for both buildings (11 per building). The site plan provided by applicant indicates 42 parking spaces.

Article IV, Section E. 3. A. Compact Car Requirement in the Zoning Ordinance states "compact car parking spaces shall be a minimum of 30% of the required parking spaces and no more than 40 of the required parking spaces". Applicant shows no compact parking spaces according to site plan.

Reference Zoning Ordinance *Article IV, Section E. 4. C (2).* According to this requirement, 20 parking spaces would be required to be pervious. Site plan shows only 12 of the 42 parking spaces as being pervious.

Samara reviewed the variance criteria as listed in the Zoning Ordinance:

1. Extraordinary and exceptional conditions pertaining to the particular piece of property in question because of size, shape or topography
2. Application of ordinance to this property would create unnecessary hardship. Personal finance hardship is not a justification for variance.
3. Such conditions are peculiar to the particular piece of property involved, and
4. Relief, if granted, would not cause substantial detriment to the public good and impair the purpose and intent of this ordinance; provided however that no variance may be granted for a use of land or building or structure that is prohibited by this ordinance.

Staff finds criteria is not appropriate for the review of an application of this type.

Staff recommends DENIAL of the parking variance. Reason: these four points deal specifically with the land itself. Additionally, the applicant has not presented a substantial hardship that would justify the request for nearly double the maximum allowable parking. In summary, the zoning ordinance would require:

1. 22 parking spaces (proposing 42)
2. 30% of the 22 should be compact (proposing zero)
3. Any parking over and above the 22 should be pervious (proposing 12 out of 42)

If the Board would like to approve the variance, conditions would have to be met within 365 days.

Hunter: This is a procedural issue. Staff has no problem with the request. The zoning ordinance does not currently have a mechanism to review a case of this nature involving parking. A variance, in this case, is not an appropriate request. A special exception would seemingly be more appropriate. However, at this time, the Zoning Ordinance does not address criteria for a special exception for parking. Hunter said he is working with applicant on other options.

The building on the north side will be housed by S. E. Civil, the engineer of record Larry Smith. S. E. Civil has 17 employees plus 5 company vehicles which will remain in the parking area overnight. This brings the total parking to be used by one business/building to 22 parking spaces and that does not include potential visitors.

Cathy asked if applicant would have to wait a year to reapply if variance is denied? Hunter said yes. But if scope or zoning ordinance changes, it can be heard again without waiting for a year.

John said this proposed site is over 6,000 s. f. of commercial space with only 22 allowed parking places. It seems to be encouraging parking on the street. He asked Hunter if staff intends to change the zoning regulations to allow for more parking spaces in B-4. One size does not fit all. The proposed project does not look like it has enough parking even with if variance was approved. This zoning restriction on parking spaces seems to discourage development in Fairhope.

Cathy asked if zoning changes could happen in 2 months.

Hunter said zoning changes and parking requirement changes are on the short list, but best-case scenario is 3 months for changes.

Applicant Larry Smith spoke in support of the variance. His office will be moved to this new location once developed. He said he has a Plan B (MOP process) if the variance is not approved, he will likely apply for a MOP. He said the zoning of this property creates a hardship. Most all of his vehicles (company and employees) are full size trucks. Most of his company work is done digitally and he does not anticipate much customer traffic. He could not answer for the real estate company that intends to be in the second building. Larry said MOP approval is not guaranteed and he encouraged BOA members to consider this case uniquely from other cases. He does not feel a precedent will be made of this variance is approved, however Hunter disagrees. He feels there is an issue with the Zoning Ordinance in regard to the parking issue.

Dick is concerned with traffic and parking when this site is developed.

Larry said his operation is mostly developmental and digital with very minimal customer traffic. He cannot answer for the real estate company that will occupy the building next door.

John asked what the hold up would be if going with Plan B. Larry said the MOP process is not guaranteed and would likely be a long process.

Cathy asked if parking would be sufficient if it was only one building. Larry said if there was only one 3,000 s. f. building there then they would only be allowed 11 parking spaces.

John noted his personal office having to use off-site parking because of limited parking spaces. He anticipates same issue with this property.

Larry said he has field crews and inspectors in and out all day.

Christina asked Larry if other materials have been considered for parking to add extra parking without the variance.

Anil suggested gravel as parking places. Hunter said this idea could be considered as green space in the MOP process.

Hunter cautioned the Board to be mindful of their decision; they could be making a precedent for future cases. He said the MOP process would not be a lengthy process.

John said it is his understanding, per conversations with attorneys, that precedent will not be made since each case is heard separately.

Larry said if he is not allowed to build here with variance, he may be forced to move his building across the street to a county building. Work on site has started. He didn't perceive this as an issue to begin with. He concurred with John, no precedent since each case is unique.

Cathy asked for clarification on the special exception procedures vs. variances.

Hunter gave clarification.

Anil opened the public comment period but there was no one to speak against the project.

Cathy made a motion to accept staff's recommendation for denial for reasons stated (no hardship).

Christina 2nd the motion.

Votes to accept staff's recommendation for denial:
Anil Vira: Aye
Cathy Slagle: Aye
Dick Schneider: Abstain
Christina Stankoski: Aye
John Avent: Aye

Motion passed with 4 for DENIAL with Dick abstaining his vote.

Reason for denial: Has not proved hardship

CHRISTINA HAD TO LEAVE AT 5:50 P.M. ALTERNATE DAVID MARTIN ATTENDED IN HER PLACE

BOA 21.04 Public hearing of Harold Thompson, Belgrove Estates, Inc. requesting a rear set back variance for 325 Pecan Ridge Boulevard, Lot 5, property zoned R-2.

Hunter: The staff report is incorrect. Applicant is requesting 2' not 7' variance. Staff report says set backs are 35' in rear. Front set back is 45'. BOA past case April 16th, 2018 BOA 18.04. The applicant received a variance for 35' in the front and rear set back of 30'. Application is correct; it reflects a variance for 2' variance for 30' rear set back.

This is a unique shaped lot. Rear set back is 30' as per previous variance. Margin of error of 2' is the request. No hinderance to neighboring properties. Similar issues and resolution with similarly shaped lots in the area.

Summary: The applicant is requesting a 2' variance to the rear property.

Hunter said there are extraordinary and exceptional conditions pertaining to this lot; lot is irregularly shaped. The site is unique. Relief, if granted, would not cause detriment to the public nor impair the intent of this ordinance.

Staff recommends approval of this 2' (not 7' as stated in staff report) variance with no conditions.

Anil opened the session for Public Comments:

Frank and Lisa Vitello, residents of Carya Pointe Estates, spoke on behalf of the applicant, in favor of the project. They are the potential buyers of the property. The property has been listed for sale for over 1500 days. Builders have said no house can be built on this property, but they are in contact with an architect and builder who has drafted a plan for a house to be built on this property if a 2' variance is approved. Proposed house is 2,250 s. f. and this lot backs up to 32 acres of undeveloped acreage.

Dick asked if this would impact anyone else's property. Frank said the property rear abuts a large wooded area. Anil said all surrounding property owners have been notified as per zoning requirements.

Mr. / Mrs. Vitello have not heard from any of the neighbors.

Cathy asked if the house could be built at 2,000 s. f. (which is the minimum for this subdivision) without the variance. Lisa said the house as proposed could not be built within the existing footprint without the variance. Reducing the s. f. of the home is not feasible.

Anil asked for clarification on the past variance passed for this property. Hunter said there was a variance passed for 10' in the front, 5' in the rear.

No one spoke against the project.

Anil closed the public comment period since no one spoke for or against the property.

Dick made a motion to accept staff's recommendation and approve the 2' rear yard set back variance.

David 2nd the motion.

Motion: Accept staff's recommendation to approve the 2' variance.

Anil Vira: Aye
Cathy Slagle: Aye
Dick Schneider: Aye
David Martin: Aye
John Avent: Aye

Motion passed unanimously.

Anil reminded applicant to record the variance with probate within 365 days.

Old/New Business:

Anil asked if there was any old or new business to address.

Cathy would like packets printed and delivered again, or she can pick them up.

Hunter said he will honor her request and can work with members one on one if they wish to receive printed copies of the packets. He appreciates any of the members who request only digital.

Cathy made a motion to adjourn. Dick 2nd the motion.

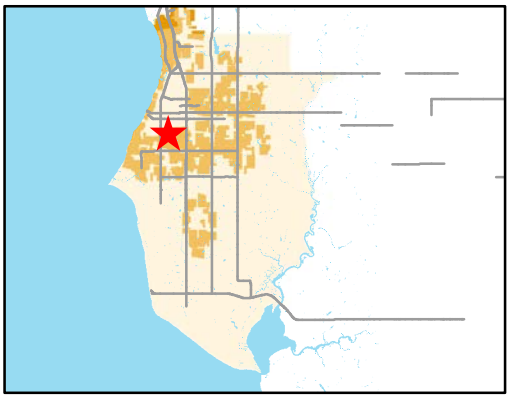
Adjourned at 6:05 p.m.

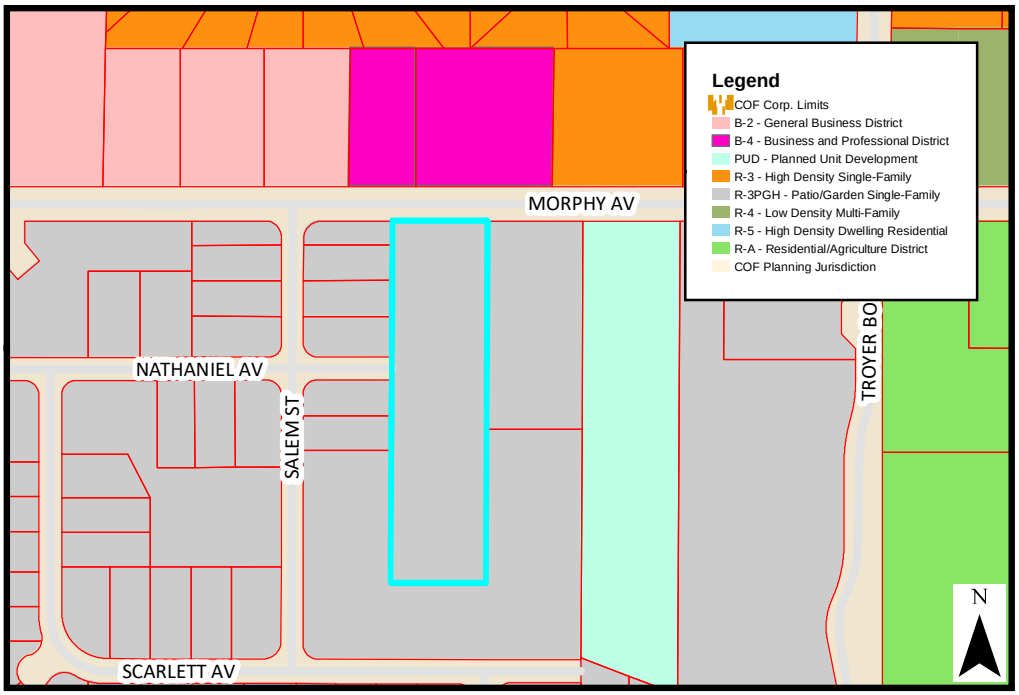
_____	_____
Anil Vira, Chairman	Kim Burmeister, Planning and Zoning

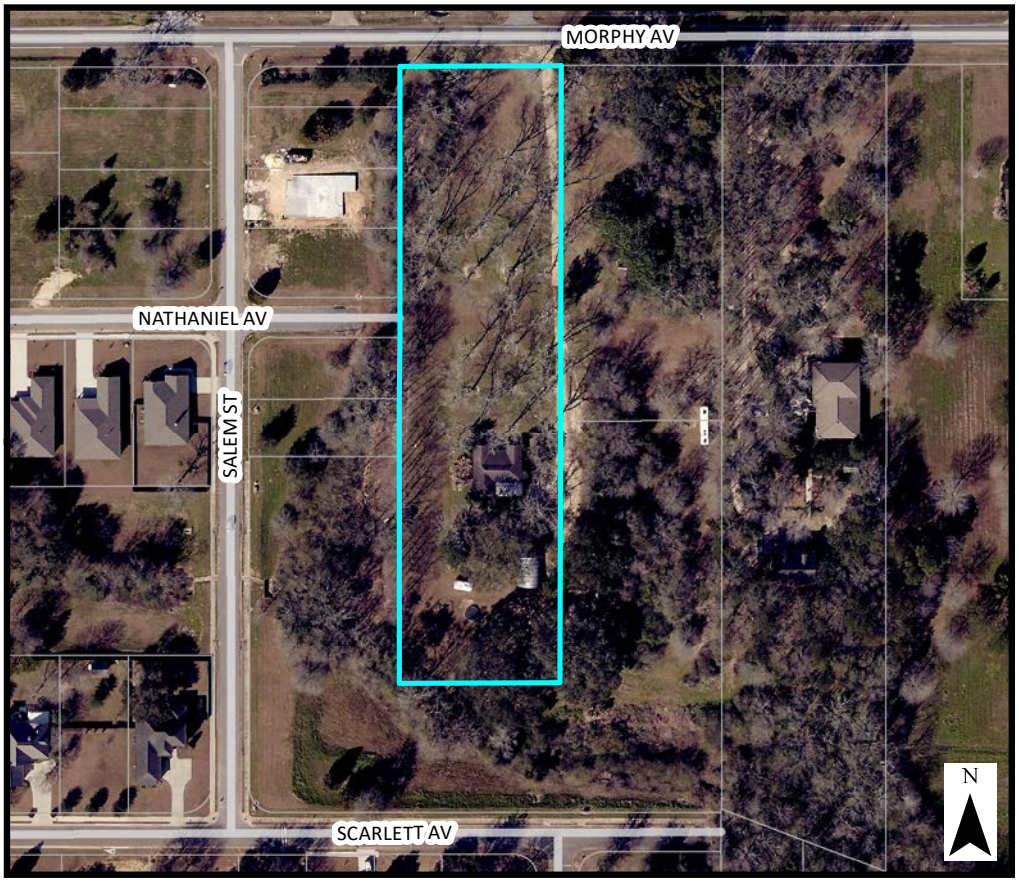
City of Fairhope
Board of Adjustment and Appeals

May 17, 2021

BOA 21.07 - Morphy Ave Electrical Substation







Project Name:
Morphy Ave Electrical Substation
Application Type:
Special Exception
Variance Type:
Public Utility
Jurisdiction:
City of Fairhope
Zoning District:
R-3PGH
PPIN Number:
108954
General Location:
South side of Morphy Ave, approximately 250' east of Salem St.
Surveyor of Record:
Engineer of Record:
Sawgrass Engineering
Owner / Applicant:
City of Fairhope
Recommendation:
Approval
Prepared by:
Hunter Simmons

Summary of Request:

Fairhope Utilities, is requesting a public utility use which is not allowed by right but by special exception in Fairhope's Zoning Ordinance for the property located at 8300 Morphy Ave. The subject property is zoned R-3PGH. The applicant desires to install a new electrical substation that will allow for Fairhope Utilities to better serve its customers.

Comments

The City of Fairhope Electrical Department is requesting a use on appeal to allow a public utility – an electrical substation – at 8300 Morphy Ave. In 2019, Stewart Engineering performed a comprehensive engineering report that focused on the age, capacity, and future growth projections for each of the current six substations. In response, the Fairhope Public Utilities has been upgrading or replacing substations, as evidenced by the new substation at 621 Nichols Ave.

The Fairhope Avenue Substation was at 106% of the base capacity in 2019. That has increased to 110% since 2019. Due to its location, the Fairhope Avenue Substation cannot be expanded. A new substation must be installed to handle the increased capacity needed within the system. Several sites along Morphy Ave were considered. The proposed site was selected due to topography and proximity to existing infrastructure.

A proposed site plan is provided. The Fairhope Electrical Department recognizes any substation installed in the area, in a location that will be most beneficial to the public, will pose concerns to adjacent property owners. The proposed site plan is provided, but not finalized. The Electric Department is open to ideas that will mitigate as many concerns as possible, including, but not limited to, location within the site, screening, plantings, etc. It should be noted that moving the location within the site is limited due to natural topography of the existing landscape. Reports to address concerns about noise and magnetic fields were provided by Stewart Engineering and are included for review.

The review criteria for a use appeal is as follows:
Article II. Section C.e(2)
Any other application to the Board shall be reviewed under the following criteria and relief granted only upon the concurring vote of four Board members:

(a) Compliance with the Comprehensive Plan:
Response: The Comprehensive Plan refers to infrastructure and states the City needs to plan, provide, and maintain cost-effective and efficient infrastructure that promotes orderly growth and meets environmental goals.

(b) Compliance with any other approved planning document;
Response: None noted.

(c) Compliance with the standards, goals, and intent of this ordinance;
Response: Complies

(d) The character of the surrounding property, including any pending development activity;
Response: The subject site located at 8300 Morphy Ave is bordered to the west, south, and east by R-3PGH and to the north by B-4 zoning. Much of the site is surrounded by the detention and

greenspace area of Hawthorne Glen , Phase Two. There are five single-family residential homes adjacent to the property. Alternate sites were surrounded by more homes.

(e) Adequacy of public infrastructure to support the proposed development;
Response: No issues noted.

(f) Impacts on natural resources, including existing conditions and ongoing post-development conditions;
Response: The southern portion of the site contains hydric soils, which may indicate wetlands, which contributes to the location of the proposed location of the substation.

(g) Compliance with other laws and regulations of the City;
Response: No issues noted.

(h) Compliance with other applicable laws and regulations of other jurisdictions;
Response: No issues noted.

(i) Impacts on adjacent property including noise, traffic, visible intrusions, potential physical impacts, and property values;
Response: Feedback to mitigate impacts on adjacent properties is requested.

(j) Impacts on the surrounding neighborhood including noise, traffic, visible intrusions, potential physical impacts, and property values.
Response: No issues noted.

(k) Overall benefit to the community;
Response: The use proposed will enhance an aged outdated system providing better service to Fairhope Utility customers.

(l) Compliance with sound planning principles;
Response: Staff believes this use is in keeping with sound planning principles.

(m) Compliance with the terms and conditions of any zoning approval; and
Response: No issues noted.

(n) Any other matter relating to the health, safety, and welfare of the community.
Response: No issues noted.

Staff Recommendation: Staff recommends **APPROVAL** of the appeal for public utility facility uses at 8300 Morphy Avenue with the following conditions:

1.) A 20’ landscape buffer is provided along Morphy Ave.
2.) A landscape plan be provided showing future trees and plants to mitigate impacts on adjacent property owners.

May 4, 2021

Case: BOA 21.07

RE: Case BOA 21.07: Proposed Electrical Substation Location on Morphy Ave.

Dear Board of Adjustment Members,

Due to substantial load growth in all sectors, the City of Fairhope Electric Department must upgrade its existing electrical substations. One substation of particular concern in the existing Fairhope Avenue Substation, located at the East Water Tank, adjacent to Fairhope Avenue. It is the most loaded electrical substation, with peak loads of over 110% of base capacity. Fairhope Avenue Substation was built in the 1990's and, due to its site location, cannot be expanded.

A new site must meet certain criteria to be efficient and reliable. One main criterion is that it must be readily accessible to the 46KV sub-transmission line, which runs along Morphy Ave. Another important criterion is that it must be located so as to facilitate integration into the existing 12KV distribution line system.

Yet another important requirement is that the substation should be located as near to the electrical loads as possible. Doing so will reduce feeder lengths, thereby reducing both direct initial construction costs, and future operating costs. When these requirements are met, the City can continue to provide reliable power to our customers, at economical rates. The proposed Morphy Avenue site meets these requirements and is an ideal location for the new substation.

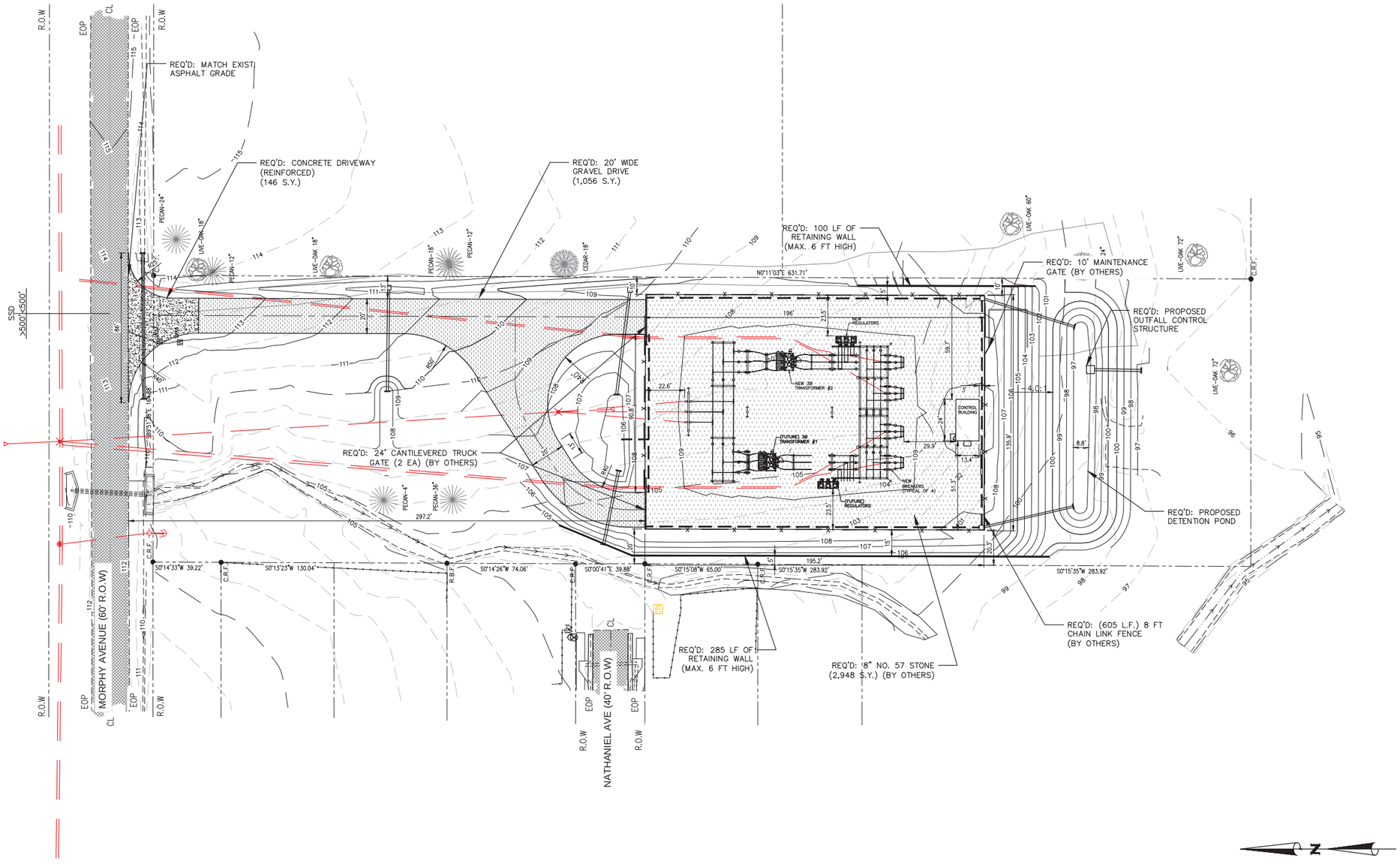
Thank you for your consideration,

Jeremy Morgan
Interim Electric Superintendent
City of Fairhope Electric Department

161 North Section Street
P.O. Drawer 429
Fairhope, Alabama 36533
251-928-2136
251-928-6776 Fax
www.fairhopeal.gov

LEGEND

● C.R.F.	CAPPED REBAR FOUND
● C.T.I.F.	CRIMPED TOP IRON FOUND
● I.P.F.	IRON PIPE FOUND
● O.T.I.F.	OPEN TOP IRON FOUND
● P.K.N.F.	"PK" NAIL FOUND
● P.T.I.F.	PIG TAIL IRON FOUND
● R.B.F.	REBAR FOUND
● R.R.S.F.	RAILROAD SPIKE FOUND
● R.B.F.	REBAR IRON FOUND
○ C.R.S.	1/2" CAPPED REBAR SET "CA 1007-LS"
○ P.K.N.S.	"PK" NAIL SET
○ R.R.S.S.	RAILROAD SPIKE SET
■ C.M.F.	CONCRETE MONUMENT FOUND
-o-	POWER POLE
←	GUY WIRE
CTV	CATV PEDESTAL
FH	FIRE HYDRANT
WM	WATER METER
WV	WATER VALVE
	EXIST. FENCE
	EXIST. PROPERTY LINE
	PROPOSED CENTERLINE
	EXIST. DRAINAGE SWALE
EOP	EXIST. PAVEMENT
R.O.W	EXIST. RIGHT-OF-WAY
CL	CENTERLINE
	NO. 57 STONE



GRAPHIC SCALE

0 15 30 60

1 inch = 30 feet

NUMBER:	REVISION:	DATE:

Sawgrass

ENGINEERING - SURVEYING - CONSTRUCTION MANAGEMENT

30673 Sgt. E. I. "Boots" Thomas Drive, Spanish Fort, AL 36527 Phone: (251) 544-7900

GEOMETRY PLAN

MORPHY SUB STATION

CITY OF FAIRHOPE

SCALE: 1" = 30'

DATE: MAY, 2021

DRAWN BY: BAT

CHECKED BY: JHR

SHEET: 4 OF 9

Electrical Consultants
STEWART ENGINEERING

P. O. Box 2233 (36202)
300 E. 7th St. (36207)
Anniston, AL

Phone 256-237-0891

May 12, 2021

Ms. Sherry Sullivan, Mayor
161 North Section Street
Fairhope, AL 36532

Re: Proposed Morphy Substation - Noise

Dear Mayor Sullivan:

We realize that both of the documents received from VTC (Virginia Transformer Corporation, the Manufacturer of the Transformer that Fairhope has purchased for the subject site) are quite technical in nature. To help you, we have taken both of these documents, read through them, and highlighted important points.

We have a few comments to make in Summary:

A. **Transformer Sound Levels**
The Specifications used to guide the manufacturing of this Fairhope transformer required a final sound level at 6dB below NEMA Standards (the NEMA Standard is 70 dB), at a maximum. The Factory Tests Reports show your unit tested at 7dB below NEMA Standards, which would be 63dB. Remember that this is when measured at 1' and 6' from the transformer. Sound will diminish significantly as the distance increases. Even said ... will there be transformer noise? ... Yes, always. Will it be bothersome? It all depends on who you ask. As was noted in the white paper, noise reduction by sound screens or sound walls would be an option for improved sound attenuation. Sound attenuation can even be reduced by plantings, especially evergreen plantings.

B. **Magnetic Fields Caused by Current Flow in Power Lines**
Important point ... Magnetic field strength rapidly diminishes with distance from an electrical source.

The drawing on Page 10 of the subject document shows that at a distance of 10 meters from the source, the magnetic field strength for the Morphy Substation (46 KV / 12 KV) incoming and outgoing power lines will have dropped to below 6 mG. The magnetic field strength at a distance of 40 meters (approximately 130 feet) from the source would be 0 mG. The drawing on Page 9 shows that the magnetic field strength at a vacuum cleaner inside a house is 300 mG, and at a power saw it would be 200 mG. The magnetic field strength at the neighboring houses would be less from this Substation than they are from the existing power lines which presently provide them with electrical service ... and even that is MUCH less than the magnetic field strength of in-house appliances.

See Page 11 in the subject document: Beyond the Substation fence, the magnetic field produced by the equipment within the Substation is typically indistinguishable from the background levels from other sources. Modern power transformers are built to keep the magnetic field within the core of the transformer to maximize its efficiency.

We hope this helps. Don't hesitate to let us know if we can be of further assistance.

Sincerely,

STEWART ENGINEERING, INC.

Lance Junkin

LJ:tcv

Transformer Noise

Lokesh Solanki
VTC Engineering Department

Introduction:

- **What is sound?**

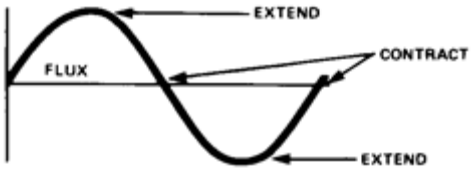
  Sound is an air pressure disturbance that human ear can 'hear'. Speech produces sound and disturbances produced by practically everything that moves. the frequency of the sound wave is perceived as pitch and amplitude is perceived as loudness.

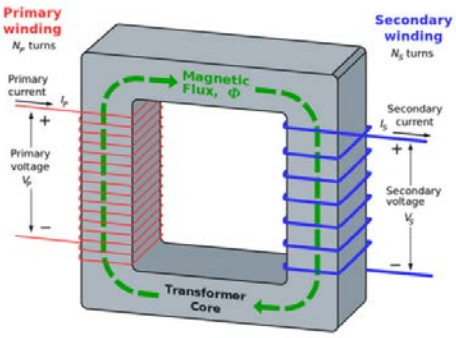
  When the sound in unwanted, it becomes "Noise". Transformers in operation emit noise, the magnitude of noise increases with its size in MVA and its voltage class.

  Sound level for transformers is specified in NEMA TR1.

- **How it is produced?**

  Transformer core noise is caused by a phenomenon called magnetostriction. In very simple terms this means that if a piece of magnetic sheet steel is magnetized it will extend itself. A transformer is magnetically excited by an alternating voltage and current so it becomes extended and contracted twice during a full cycle of magnetization. The frequency is 2X of the frequency of the voltage.





  A transformer core is made from many thin sheets of special electrical steel. It is made this way to reduce losses due to circulating eddy currents, and the consequent heating effect. If the extensions and contractions described above are taking place in various directions depend upon the clamping of the laminations, each sheet can nonuniformly behave over its length and width. This 'writhing' and twisting motion produces harmonics of the fundamental frequency up to the 16th harmonic. These extensions are a few micro inches dimensionally, however, sufficient to cause a vibration as noise. This is the core noise.

  Apart from the core noise, transformer windings contract and expand with the current. The frequency of winding noise is that of the current. The noise generated by core and winding is transmitted to the tank wall via the mechanical structure and through the oil. The magnetic shields, if used, will also vibrate with the magnetic flux and create noise.

  During operation, transformer generate heat which is dissipated by radiators, fans are used to enhance cooling. The fan motor and blades, causing additional noise. The fan noise is added to transformer noise and total noise of transformer during operation increased.

- **What is the significance of sound to the quality and reliability of transformer?**

  The transformer noise is mainly due to vibration in the core laminations due to magnetostriction. As we all know vibration is not good for any device. The effect of vibration in transformer is as bad as of any rotating equipment. More noise means more vibration and more vibration means more abrasion of transformer insulation. Vibration also cause looseness in hardware. Insulation

abrasion will lead to coil failure and lose hardware leads to increased vibration and increased insulation abrasion, and loosening of electrical connections.

How to mitigate transformer Noise?

- In order to mitigate transformer noise, it is essential to know the amount of noise generated by transformer. With wide range of transformer design and number of transformer tested designed and tested for noise level, VTC/GTC has developed an empirical formula to estimate noise level generated by transformer during operation.

  $$\text{Transformer Noise} = K_1 \lg W + K_2 B + K_3 \text{ [dB]} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

  Where, W = Core weight, B = Flux Density and K_1, K_2, K_3 = coefficients and constants
  These can be evaluated with large amount of data and then used to predict the noise from a transformer.

  Using various design considerations as explained below the overall transformer noise is reduced at design stage.

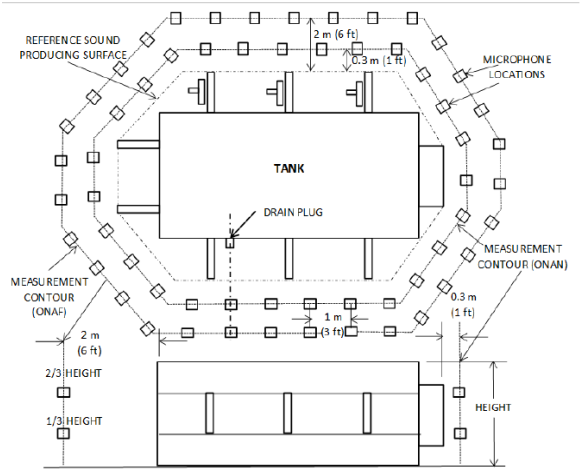
- Reduction of noise from Core:
  a. No-load sound level of core mainly depends on Magnetostriction and magnetic forces. The magnitude of Magnetostriction could be reduced by lowering flux density. The studies show that reducing induction by 0.1 Tesla flux density, noise of transformer's core reduces by 3 - 4 dB. Flux density is inversely proportional to the core weight, means the weight and cost of the transformer increases. This method, while the easiest, is the most costly method.
  b. Grade of CRGO laminations, which is used for making the core, should have properties such as low loss, high permeability and low noise generation from core. When applying high B and laser scribed laminations, it is possible to reduce transformer's noise for approximately 3 dB.
  c. Core construction is also important to reduce noise generated by core. Study shows that step-lap lap core construction reduces the noise of the magnetic core for up to 6 dB. At lower inductions with step-lap even greater noise reduction can be achieved.
  d. Well-designed clamping and tightening structure and techniques for the core yokes and legs can reduce the noise due to reduced magnetostriction and reduced interlaminar 'chatter'. Controlling the 3 dimensional 'undulation' of the core assembly will also reduce the harmonics.
  e. The vibration of transformer core sheets is the main source of noise generation in transformer. Tightening the core and reducing gaps in the corners will help to reduce core noise. Core laminations are tightened with glass tape (stage B epoxy) banding. This tightens the core uniformly when it is heated and leads to very strong and uniform tightening of core steel. Use of non metallic bolts for tightening of core yokes will provide additional tightening of the core lamination which helps core to produces less amount of noise.
  f. Bottom yoke of core and core legs after stacking, are coated with varnish or wood glue to reduce vibration of the sheet edges.
  g. The peaks in angles overhanging of laminations (horns) are cut off, since they are free and vibrate due to the magnetic flux. Alternatively, they can be covered with a putty to keep them from vibrating.

- Reduction of noise from Winding
  a. Specific winding's noise reduction is achieved by increasing the conductor's size, or increasing the transformer's impedance. This however will increase the amount of copper in the cost of the transformer.
  b. For large power transformers special kind of transposed conductors for making windings are being made in order to reduce losses in the windings and winding's noise reduction.

c. Tightness of winding during manufacturing process, and pressing these axially during drying stage, at certain pressure will reduce the 'accordion' effect during operation.
d. Moreover, on magnetic circuit assembly after drying process assure winding compression. A tightly compress winding will help to reduce winding noise.

- Reduction of Noise Transfer to the Tank
  a. Avoid mechanical connection between core and coil assembly and tank surfaces to eliminate structure borne noise transmission. No direct connection to tank base or tank wall. Use vibration damping arrangement between all connection points between core and coil assembly and tank walls bottom and top.
  b. Use of wall sound barriers to reduce oil borne noise. Oil barriers and cushion padding may also help insulate transformer noise and prevent it from spreading.
  c. The distance from the noise producing surfaces to the tank wall can be adjusted for the fundamental noise frequency to 'reflect' most of the sound pressure from the tank wall and 'dissipate' the sound energy in the oil.

- Reduction of Fan Noise
  a. Fan's noise reduction is achieved with fewer numbers of rotor's revolutions per minute of the fan, but at the same time it reduces the cooling capacity, thus the commonly used fans are with greater number or with larger diameter of blades, in order to compensate the reduced cooling capacity.
  b. Reduction of fan's noise can be achieved through balancing the rotating masses, quality of bearing and stable structure for securing the fan to the tank or the radiator for cooling.
  c. Fan structure borne noise can be reduced by providing vibration dampening material in mounting arrangement between fan to the tank wall.
  d. The location of fans on transformer also affects the overall noise of the transformer. Use multiple radiator banks and fan bank. Multiple radiator banks will help to increase overall sound producing surface and hence measurement contour for ONAN & ONAF testing. Multiple fan banks will help to reduce overall fan born noise to keep FA sound low.

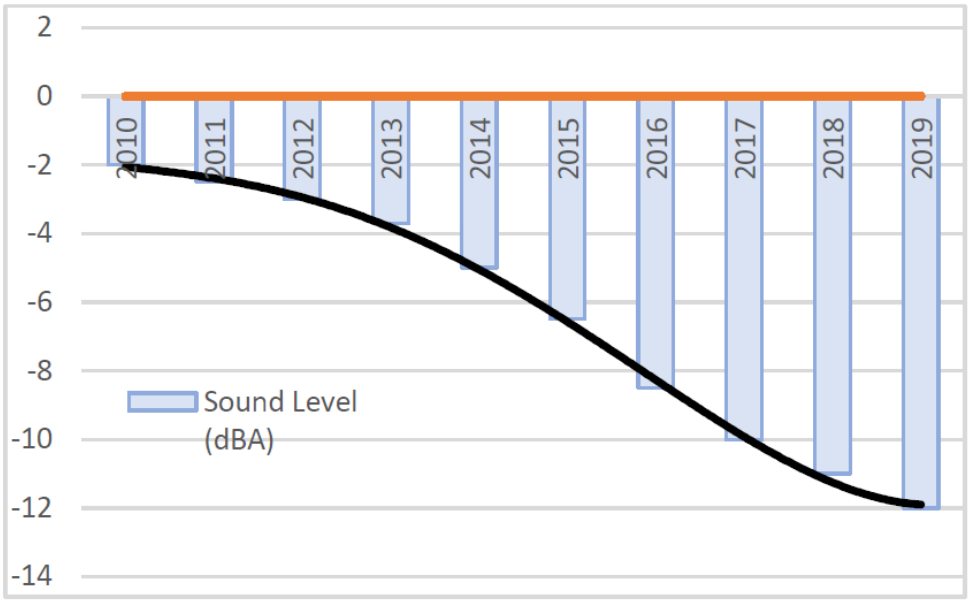


- Reduction of Overall External transformer Noise
  a. While installing transformers at customer site, use external vibration dampeners along with flexible connections and mounting methods. This prevents metal contact between the mounting surface and the unit, to reduce noise transmission.

b. Noise reduction by sound screens or sound walls would be next best option for sound attenuation. The sound barrier will help reduce the noise in surroundings and reduce sound travel.

VTC/GTC Achievement in transformer sound reduction

- VTC/GTC achieved 12dB sound reduction to NEMA TR-1 requirement by rigid mechanical design of core and coil, reduced vibration from coil by geometry and material and dampening of vibration emitted from core and coil assembly, reducing transmission of vibration and noise from transformer inside to outside. The graph below shows VTC/GTC achievement of transformer noise reduction compared to NEMA TR-1 –2013 a standard describing transformer sound level requirement. *****



Year of Mfg.	Description	Measured Sound, dBA		NEMA Rating, dBA		Difference - ONAN	Difference- ONAF
		ONAN	ONAF2	ONAN	ONAF2		
2014	22.5/30/37.5MVA, 350kV BIL, 69kV	52.7	58.11	71	74	18.3	15.89
2014	22.5/30/37.5MVA, 350kV BIL, 138kV	52.83	57.82	71	74	18.17	16.18
2014	22.5/30/37.5MVA, 350kV BIL, 69kV	53.23	59.2	71	74	17.77	14.8
2015	18/21.6/24/26.8/30/33.6MVA, 450kV BIL, 115 KV	59	63.5	73	75	14	11.5
2016	11.2/14MVA, 250 Kv BIL, 69KV	56	58	69	70	13	12

*** Disclaimer**: The transformer noise reduction depends on design, material, performance, size and cost. This paper does not confirm all transformer manufactured by VTC / GTC will have reduced sound as standard function. The noise level performance shown above are the jobs designed to achieve specific noise reduction.

References

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2. 2015 IEEE Std C57.12.90 – IEEE standard test code for liquid immersed Distribution, Power and Regulating Transformers, 2016 IEEE, New York.
3. S. V. Kulkarni, S. A. Khaparde, "Transformer engineering design and practice", 2004 New York Marcel Dekker Inc.
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5. Ruchi Negi, Prateek Singh, Gaurav Shah "Causes of Noise Generation & its Mitigation in Transformer" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 5, May 2013
6. Luis FERNÁNDEZ BRAÑA, César M. A. VASQUES, Hugo M. R. CAMPELO and Xosé M. LÓPEZ-FERNÁNDEZ "Quite Transformers: Design Issues" Advanced Research Workshop of Transformers 28-30 Oct 2013

Understanding Electric and Magnetic Fields

BC Hydro
Power smart

Contents

We've provided this booklet to explain electric and magnetic fields (EMF) and to summarize what national and international health and scientific agencies say about EMF.

We've included the following:

Glossary: Look up definitions of technical terms. Terms in the glossary are bolded the first time they are used in the booklet.

FAQs: Look at responses to some of the most frequently asked questions about EMF.

Contact Information: Contact us for more information or to borrow a magnetic field measuring kit.

Resources: Refer to this list for additional details, including links to scientific studies and information from established health authorities.

What we do about EMF

If you're looking to purchase a home that's located near a power line or if there's a new line being proposed for your neighbourhood, you may have questions about living near this type of electrical infrastructure.

The majority of the concerns we hear are about electric and magnetic fields given off by power lines. Electric and magnetic fields, commonly referred to as EMF, are invisible energy fields that are prevalent in our daily lives.

Some key facts and conclusions about electric and magnetic fields from power lines:

- EMF levels decrease rapidly the further you are from the source. This means that by the time EMF from power lines reach your home they're often at lower levels than those already present in your home.
- At the street level, the magnetic field levels from our power lines are actually very low, often lower than the level given off by home appliances.
- Magnetic fields aren't shielded or blocked by putting power lines underground.
- Despite long-term extensive international research over the last 40 years, no health consequences have been established from exposure to EMF at levels less than recommended international guidelines.

What we do about EMF continued

This conclusion is based on research and findings of national and international health authorities including Health Canada and the World Health Organization. We understand the relationship between EMF and health will continue to be the subject of ongoing research which is why we:

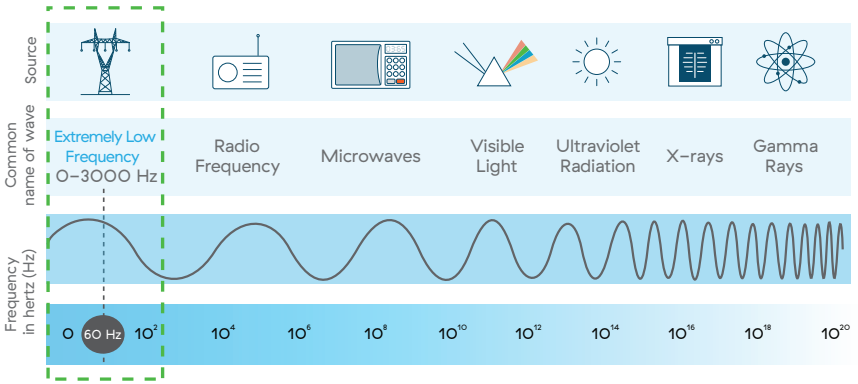
- Communicate openly and provide balanced, accurate information about EMF.
- Commission a regular summary report on the progress of scientific and medical research in this field. These reports, produced by an independent research group are available on bchydro.com/emf.
- Monitor developments with Health Canada and World Health Organization to ensure we follow their guidelines on EMF and power lines.
- Follow all federal and provincial legislation and regulations addressing EMF and ensure all our facilities and lines comply with applicable EMF standards.
- Take appropriate steps to reduce EMF levels in the design of new and upgraded electrical equipment.

What are electric and magnetic fields?

Electric and magnetic fields (EMF) are present everywhere electricity flows. Electrical appliances, household wiring and power lines all produce EMF. These fields are part of a broad range of waves called the **electromagnetic spectrum**, which includes other waveforms such as radiowaves, microwaves, infrared rays and x–rays.

In North America, power line's alternative current (AC) standard frequency is 60Hz. That means the current cycles back and forth 60 times per second. The EMF produced by the power line has the same frequency of 60 Hz, categorizing power line EMF as Extremely Low Frequency (ELF).

FREQUENCIES OF THE ELECTROMAGNETIC SPECTRUM AND COMMON SOURCES



This diagram shows the different levels of energy that make up the electromagnetic spectrum. The energy of waveforms increases exponentially as the frequency moves from low to high.

Source: Institute of Electrical and Electronics Engineers.

Comparing electric and magnetic fields

Although they are often referred to together as EMF, electric fields and magnetic fields are actually two distinct components of electricity.

Electric fields are produced by voltage in a wire, such as a power line. An electric field is also present when an electrical appliance is plugged into an outlet even if it's not turned on. They can be blocked or shielded by objects like buildings or trees.

Magnetic fields are produced when electric current is flowing, so they're only present when an electrical appliance is turned on. As the flow of electricity—the current—increases, the magnetic fields increase. Magnetic fields pass through most objects and can't be blocked as easily as electric fields.

Electric fields	Magnetic fields
Produced by voltage; present any time an appliance is plugged in even if it's turned off.	Produced by current; only present when an appliance is plugged in and turned on.
Measured in volts per metre or kilovolts per metre.	Measured in **gauss** or tesla. 10 milligauss (mG) is equal to 1 microtesla (μT).
Easily shielded by trees, buildings.	Not easily shielded.

For both electric and magnetic fields, the strength of the field decreases rapidly with distance from the source.

Helpful hint

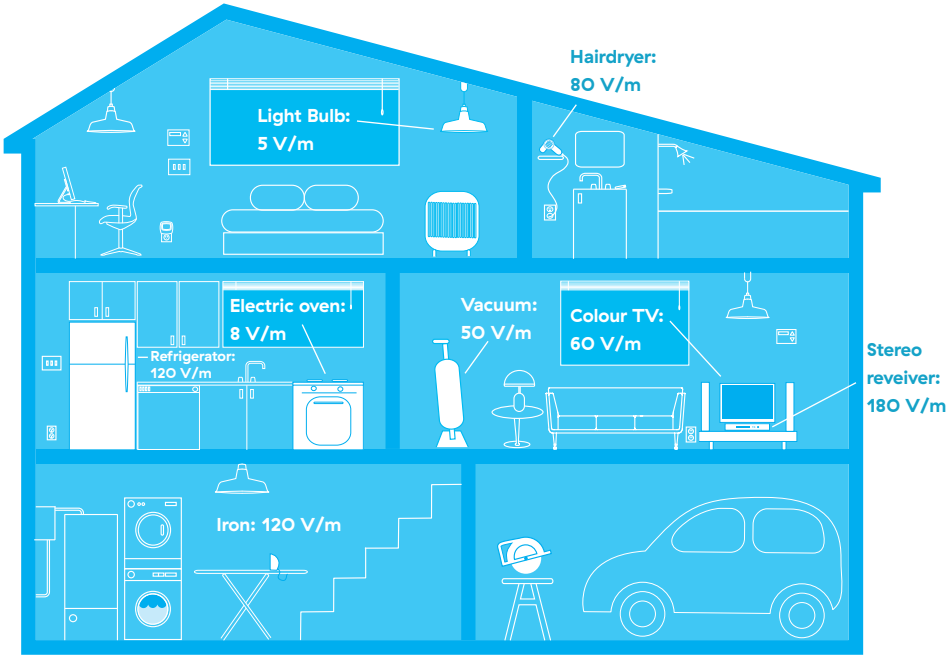
Terms set in bold are explained in more detail in the glossary. For more information related to radio frequency, see the resource section of this booklet.

Electric field strength

- Is directly related to the voltage of the line.
- Also diminishes rapidly with distance from the electrical source.

The strength of electric fields near charged electrical lines remain prettyconstant. Electric fields near a charged line exist even when electricity is not being used. This means the electrical wiring your home is producing electric field constantly even when you aren't using any appliances.

TYPICAL MAGNETIC FIELD LEVELS IN THE HOME



Source: World Health Organization, accessed 2016
All measurements were taken at 30 cm from source.

The electric fields from transmission and distribution lines change very little because of the line's stable voltage. Electric field, like magnetic field, diminishes rapidly with distance.

Electric field can easily be shielded. Trees, fences and buildings naturally reduces electric field strength and the walls and the roof of your home further reduces the electric field strength from equipment outside the home.

ELECTRIC FIELDS AND STARTLE SHOCKS

Most of the interest in possible health effects is related to magnetic fields and not electric fields; however, people may notice the presence of electric fields when they're near power lines.

Conductive objects, like a vehicle, fence line or even the ground can attract an electrical charge when they're near electric fields. When a person touches that object he or she can experience a **startle shock**. This is similar in effect to the small shock you might feel in your house after shuffling your feet on the carpet and touching a door handle.

Startle shocks aren't harmful but understanding how and when they happen can help to reduce surprise if you experience one.

ELECTRIC FIELDS AND HEALTH

In June 2007, the World Health Organization concluded that there are no substantive health concerns related to electric fields at levels generally encountered by the public. (WHO, Fact Sheet No. 322 *Electromagnetic fields and public health,* June 2007)

For more information about electric fields, visit **bchydro.com/emf**.

The remainder of this booklet focuses on magnetic fields as most of the interest in possible health effects is related to them.

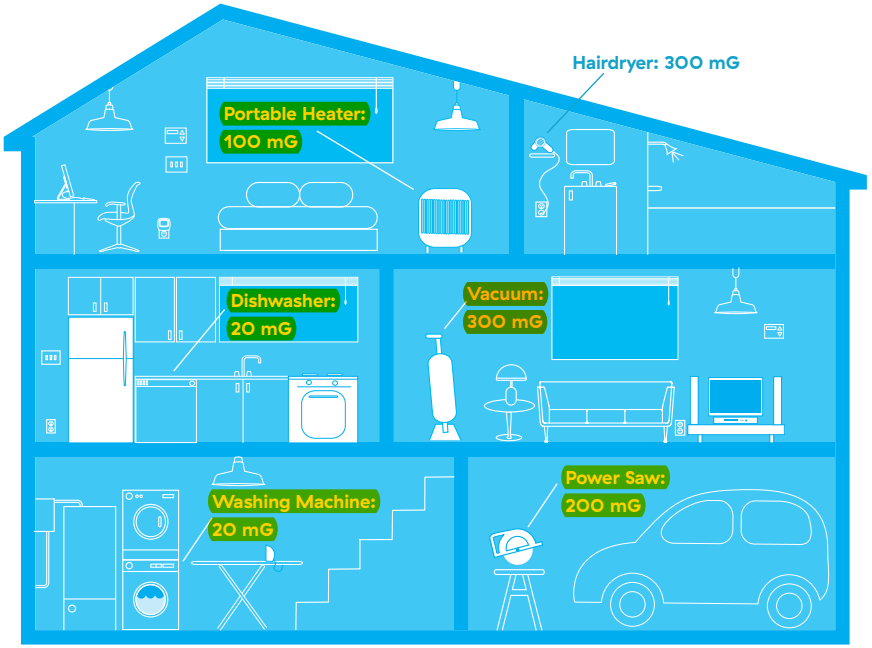
Magnetic field strength

Magnetic **field strength:**

- Is directly related to the amount of current flowing.
- Diminishes rapidly with distance from the electrical source.

For example, the strength of magnetic fields near electrical appliances depends on the current flowing through the appliance, the configuration of the wiring within the appliance, and the distance from the appliance. Due to proximity, magnetic field levels from appliances are often much higher than under power lines; however, the levels fade quickly as you move away from an appliance.

TYPICAL MAGNETIC FIELD LEVELS IN THE HOME

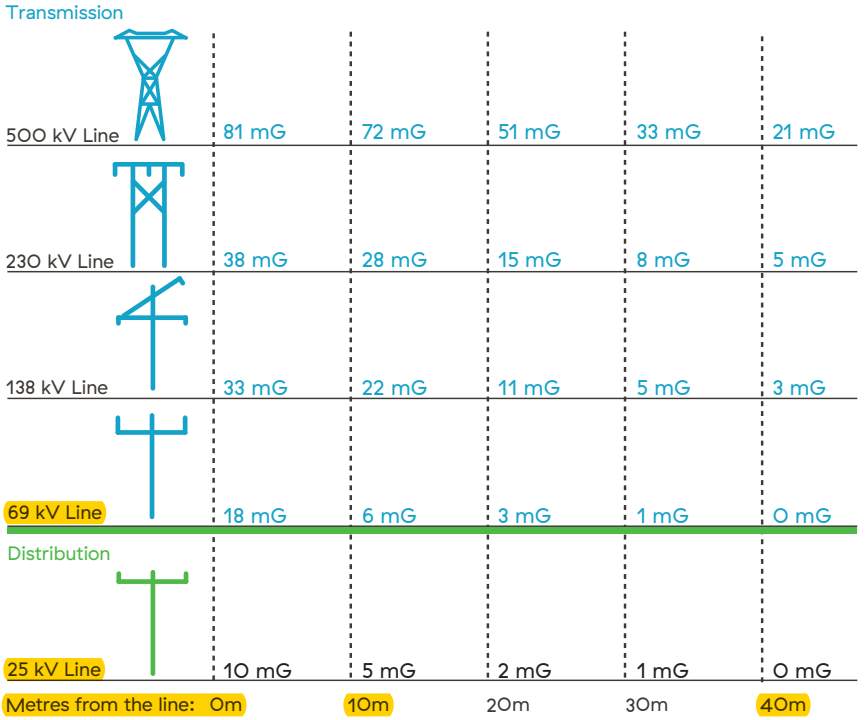


Source: *EMF in your Environment*, U.S. Protection Agency, 1992.
All measurements were taken 15cm from the sources.

Magnetic field strength (continued)

Just like appliances, the magnetic field levels from power lines depend on the current flowing on a line, the configuration of the wiring, and a person's distance from the line. The current on a transmission line will depend on the electrical load, or how much electricity is being used at any given time. In B.C. variations in current follow a fairly typical pattern, with peaks in the morning and evenings, and higher demand in the winter than the summer.

TYPICAL MAGNETIC FIELD LEVELS NEAR TRANSMISSION AND DISTRIBUTION LINES



The levels in this diagram are based on typical field levels that would be measured on most BC Hydro power line corridors in each voltage class. They are calculated using average line current and typical line heights. These levels are for general information only and are often different from levels found in EMF profiles produced specifically for new projects. Typically, a project-specific EMF profile shows the highest magnetic field levels possible during a specific line's lifetime, a condition rarely encountered and used for the purpose of line design.

TYPICAL MAGNETIC FIELD LEVELS NEAR SUBSTATIONS

Beyond the substation fence, the magnetic field produced by the equipment within the station is typically indistinguishable from the background levels from other sources. Generally, the strongest magnetic field around the outside of a substation comes from the power lines entering and leaving the station.

There is a misconception that the transformers within substations are a high source of magnetic field. Modern power transformers are built to keep the magnetic field in the core of the transformer to maximize its efficiency.

Magnetic fields & health

The question of whether exposure to electric and magnetic fields (EMF), in particular magnetic fields, causes adverse health effects has been the subject of numerous scientific studies over the last four decades with increasing quality.

The extensive health research and scientific knowledge surrounding EMF includes both **epidemiological studies** and **experimental studies** in animals, tissues and cells. These epidemiological studies and experimental studies provide pieces of the puzzle but no single study or even all the studies of just one type can give us the whole picture.

In epidemiological studies, researchers try to establish if there's a statistical association between the exposure of certain groups of people and diseases they experience. Some epidemiological studies have suggested a weak association between exposure to magnetic fields and childhood leukemia. It's unclear, however, whether exposure to magnetic fields actually caused the disease.

Some studies don't include magnetic field measurements when trying to determine an association and no epidemiological study has provided direct evidence that would permit drawing the conclusion that EMF is a cause of cancer or other adverse health effects.

Experimental studies involve exposing cells, tissues and animals to magnetic fields under controlled conditions. These studies allow researchers to closely control magnetic field exposure and provide information about any small scale biological changes that magnetic fields may cause. Experimental studies haven't provided a basis to conclude that magnetic fields are the cause of any disease. Scientists at Health Canada have been at the forefront of experimental studies to assess whether magnetic fields might cause or promote the development of cancer, but in decades of research they haven't found persuasive evidence for this hypothesis.

Many reputable health authorities such as the World Health Organization and Health Canada have conducted thorough reviews of all the different types of studies and research on EMF and health. These health authorities have examined the scientific **weight-of-evidence** and have determined that when all of the epidemiological and experimental studies are considered together, the consensus is that there is no **cause-effect relationship** between exposure to magnetic fields and human health.

We recognize that there are members of the public who remain concerned with the scientific findings to date, and we'll continue to monitor the scientific developments related to EMF.

Guidelines & exposure recommendations

Health Canada has reviewed the current scientific findings regarding exposure to Electric and Magnetic Fields (EMF) and concluded:

> *There have been many studies on the possible health effects from exposure to EMFs at ELFs. While it is known that EMFs can cause weak electric currents to flow through the human body, the intensity of these currents is too low to cause any known health effects. Some studies have suggested a possible link between exposure to ELF magnetic fields and certain types of childhood cancer, but at present this association is not established.*
>
> (Health Canada, 2016)

AS A RESULT:

> *Health Canada does not consider that any precautionary measures are needed regarding daily exposures to EMFs at ELFs. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors.*
>
> (Health Canada, 2016)

The World Health Organization (WHO) has also looked at questions around EMF. In June 2007, WHO released a comprehensive report on possible health effects of exposure to extremely low frequency electric and magnetic fields. In this report, WHO stated that the evidence related to childhood leukemia is not strong enough to be considered causal. (WHO, Fact Sheet No. 322 Electromagnetic fields and public health, June 2007)

In 1998, the International Commission on Non–Ionizing Radiation Protection (ICNIRP) developed voluntary exposure guidelines. ICNIRP is a formally recognized, international non–profit organization made up of independent scientific experts that are responsible for providing guidance and advice on non–ionizing radiation protection for people and the environment. In its guidelines update in 2010, ICNIRP recommends a residential magnetic field exposure limit of 2,000 **milligauss (mG)** and an occupational exposure limit of 10,000 mG.

These voluntary guidelines were developed to address short–term exposure only. ICNIRP determined that evidence for health effects from long–term exposure is insufficient to establish exposure standards. ICNIRP continues to monitor the research in this area.

WHO endorses the guidelines established by ICNIRP. As of 2016, there has been no change to WHO's position despite annual ICNIRP workshops and meetings on electromagnetic fields and health. You can find details of these meetings on WHO's EMF project site.

Moving forward we'll continue to monitor developments with Health Canada and World Health Organization to ensure we follow their guidelines on EMF and power lines.

Frequently asked questions

CAN I AVOID EXPOSURE TO EMF IF I STAY AWAY FROM POWER LINES?

No. EMF is found wherever there is electricity, whether in household wiring, electrical appliances, or power lines. Your exposure is determined by how strong the field is at its source, how far you're from the source, and how long you remain near the source. EMF is strongest at the source and fades rapidly as you move away.

CAN YOU ELIMINATE EMF BY BURYING THE LINES UNDERGROUND?

No. The ground will shield electric fields, but magnetic fields will still pass through.

SOMETIMES I FEEL ELECTRICITY IN THE AIR WHEN I'M UNDER A POWER LINE. WHAT'S HAPPENING?

Electric fields exist around all wires that carry electricity. Electric fields can sometimes be noticeable directly under high voltage power lines. This feeling can be discomforting (arm hair stimulation or tingling), but it's not unsafe or a health risk.

I RECEIVED A SHOCK WHEN I TOUCHED MY CAR THAT WAS PARKED NEAR A POWER LINE—WHAT CAUSES THAT?

This is called a "startle shock." It may occur when conductive objects (including people) are located within a power line's electric field and become electrically charged. When a person with a different level of induced charge contacts an object or another person, the charge is equalized (discharged) between the two bodies and the person may receive a startle shock. A startle shock will not harm the recipient but could cause surprise.

WHY IS EMF CLASSIFIED AS A CARCINOGEN?

EMF is not a carcinogen but instead is classified as a "possible carcinogen", or 2B carcinogen, by the International Agency for Research on Cancer (IARC). This classification is the weakest of three categories used by IARC to classify potential carcinogens. Other everyday items in this category include aloe vera, gasoline engine exhaust and pickled vegetables.

The 2B classification acknowledges that concerns have been raised from some epidemiological studies but conclusive evidence hasn't been found despite extensive and ongoing research.

HOW HAS BC HYDRO TAKEN PRECAUTIONS TO REDUCE POTENTIAL EMF RISKS?

Our approach is modeled after recommendations by the World Health Organization to take reasonable precautionary measures. Examples include open communication with the public, monitoring the science on EMF and the way we design our projects including increasing ground clearances and the pole position within rights–of–way.

DOES BC HYDRO HAVE MAGNETIC FIELD MEASURING KITS?

Yes, we loan magnetic field measuring equipment. The Magnetic Field Measurement Kit comes with a gauss meter and a booklet that explain how to take measurements. To borrow a kit please contact us.

HOW DOES EMF AFFECT ME IF I HAVE AN IMPLANTED MEDICAL DEVICE?

The guidelines and exposure recommendations set out in this booklet are for the average population and can't directly address the requirements of people with implanted medical devices like heart pacemakers. For more information and advice about EMF, contact the device manufacturer and the clinician who implanted the device.

IS THERE A CONNECTION BETWEEN EMF AND ELECTROMAGNETIC HYPERSENSITIVITY (EHS)?

According to the World Health Organization, electromagnetic hypersensitivity (EHS) has no clear diagnostic criteria and there is no scientific basis to link EHS to EMF.

Resources

If you'd like to learn more about EMF, we recommend the following sources:

OUR EMF WEBSITE

Our website is always being updated with new information. It also has links to the resources listed below.
bchydro.com/emf

EMF AND HEALTH: REVIEW AND UPDATE OF THE SCIENTIFIC RESEARCH

This report was prepared by an independent, technical and scientific research firm to assess the current status of research regarding the potential for health effects from exposure to EMF.
bchydro.com/emf

RADIO FREQUENCY & BC HYDRO'S SMART METERS

This site includes information on radio frequency and BC Hydro's Smart Meters.
bchydro.com/smartmeters_safety

HEALTH CANADA

This fact sheet contains basic information about EMF, typical Canadian exposures and Health Canada's role. *It's Your Health Fact Sheet: Electric and Magnetic Fields at Extremely Low Frequencies*
hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php

BC CENTRE FOR DISEASE CONTROL

This site includes statements from experts, information on scientific studies and resources for more information.
bccdc.ca/health-info/health-your-environment/electro-magnetic-exposures

WORLD HEALTH ORGANIZATION

This site from the United Nations health agency provides links to EMF fact sheets, extensive research publications and general information about EMF.
who.int/peh-emf/en

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

The US National Institute site provides information on research conclusions and results and overall information regarding EMF.
niehs.nih.gov/health/topics/agents/emf/index.cfm

CANADIAN ELECTRICITY ASSOCIATION

The Canadian Electricity Association (CEA) is the professional association of electrical companies across Canada. You'll find information about the CEA's commitments to safety and EMF research on the site.
emf.electricity.ca

Glossary

Cause–effect relationship: A relationship between two variables where one factor directly causes or influences the other.

Conductive object: in electrical engineering, a conductor is a type of material or object that allows the flow of electrical current in one or more directions. Metal is a common conductive material.

Electromagnetic spectrum: The range of electromagnetic waves, starting with long, low–frequency waves and spanning out to short, high frequency waves. The order of the spectrum is radio waves, microwaves, radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x–rays, and gamma radiation.

Epidemiological studies: Epidemiological studies look at patterns of disease occurrence in human populations and the factors that influence these patterns. These studies are observational in that they examine and analyze people in their normal daily lives to try to determine and correlate their health events with exposure factors.

Experimental studies: Experimental studies involve exposing cells, tissues and animals to a specific agent, such as EMF, under carefully controlled conditions to determine if the agent is the cause of a disease.

Extremely low frequency (ELF) fields: Extremely low frequency refers to electromagnetic fields in the range of 0–3000 Hz.

Field strength: The strength of an electric field, measured in volts per metre (V/m) or of a magnetic field, measured in gauss (G) or milligauss (mG).

Gauss or milligauss: Magnetic fields are measured in units of gauss (G) or tesla (T). Gauss is the unit most commonly used in Canada, while tesla is more commonly used internationally. Most magnetic field levels related to electrical devices are only a fraction of a gauss so it's more common to measure magnetic levels in units of milligauss (mG). A milligauss is 1/1000 of a gauss.

Startle shock: A small discharge or shock that's noticeable but not dangerous.

Weight–of–evidence review: A weight–of–evidence review critically evaluates the strength of the evidence for causality for a particular exposure and disease. It entails a comprehensive assessment of all relevant scientific research, in which each of the studies is critically evaluated and more weight is given to studies of better quality.

If you're interested in measuring magnetic field levels in your home, magnetic field measuring equipment is available on loan. The Magnetic Field Measurement Kit includes a gauss meter with a pamphlet that explains how to take measurements. To borrow a kit, please contact us at 604 699 7678 or toll free at 1 866 647 3334.

For more information:

Visit: **bchydro.com/emf**

Phone: **604 699 7678** or toll-free at **1 866 647 3334**

Email: **emf@bchydro.com**

BCH16-168

BC Hydro
Power smart

From: Andrew King
To: Hunter Simmons; Qalert 311
Subject: Proposed substation at 8300 Morphy
Date: Wednesday, May 12, 2021 9:50:32 AM

Mayor Sullivan and Mr. Simmons,

My wife and I live at 539 Salem St in Hawthorne Glenn II. Our home is adjacent to the site that the city is proposing to use as an electric substation. We obviously are very disappointed that the city has decided to purchase property zoned single family residence, next door to a subdivision with approximately fifty homes. We purchased our home in 2018 as our forever home to live out our years in retirement. One of the main reasons we chose this spot was the natural beauty directly behind us. Never in our wildest dreams would we imagine that the city we have come to love would place an electric substation in our backyard.

We have several concerns on how this project has come about with basically zero opportunity for our neighbors to voice their concerns. We found out about this project on Saturday, May 8th. We were told to send our comments in writing by Friday, May 14th, just six days from receiving the notification. Apparently, the zoning board is planning on voting on this project on Monday, May 17th. In all fairness, do you really think that a decision like this that will a life changing event for the citizens in our neighborhood can be made in just ten days? We have also learned that the city purchased land with the intent to build this facility without any public input. This would appear to be a violation of rezoning protocols.

If this city moves forward with this despite the objections from the community, we would like to know what will be done to address the following concerns:

How will the city address the certain loss of our property values?

What is the city's plan to safeguard our homes from the potential safety hazards of being exposed to EMF radiation, the effects of which are well documented and there are several homeowners with small children adjacent to this proposed substation?

How will the city diminish the constant noise disruption that emanates from high voltage electric transformers?

Will the city put in writing that the 2.4 acres will not be used in the future as a storage facility for public works or other out buildings?

Does the city plan to cut down and destroy the several hundred year old pecan trees and other foliage on the property and if so will they replace with mature landscaping to reduce the unsightly facility in our backyard?

It's incomprehensible to the people in our community that the city has not done a better job of finding a site that does not require rezoning what is currently a single family neighborhood. Surely, there are other more suitable sites available that won't ruin our quality of life and home values.

We understand the property has already been purchased. Maybe that was a mistake before getting public input but as you well know, that property will continue to gain in value and the city can resell it in the future without taking a loss. We strongly encourage you to continue to search for another site or spend the additional dollars to utilize the site behind the ABC store near Winn-Dixie.

We are looking forward to sharing our concerns with you on Monday night.

Andrew and Rebecca King
539 Salem St.
Fairhope, AL 36532
251-300-7429

From: Barbara
To: Hunter Simmons
Subject: Electrical substation adjacent to our neighborhood
Date: Monday, May 10, 2021 3:01:37 PM

To whom it may concern:

I am totally against the electrical substation in my backyard!

1. Noise
2. Health hazard
3. Decreasing property value
4. Unsightly

With all due respect please tell the city to put it in their backyard, not mine. Plenty of vacant land on Greeno away from subdivisions.

From: Christopher Wimmer
To: Hunter Simmons; Qalert 311
Subject: Substation Proposal Case BOA 21.01 - 8300 Morphy Avenue
Date: Thursday, May 13, 2021 3:06:33 PM

Good Afternoon,

We are writing in response to the City of Fairhope letter pertaining to the special exception hearing taking place next Monday, May 17th.

Our understanding is the city purchased and is proposing to build an electrical substation on the vacant lot, located at 8300 Morphy Ave. This is directly behind our house (531 Salem Street) and my neighbors. The news of this proposal is very upsetting and immediately brings several questions/concerns that are listed below.

Property Value
The impact of putting an electrical substation within a couple 100ft of our house and my neighbors will most certainly drive down the valuation of our homes. Our house is the first my wife and I have ever purchased. The thought of losing money and potentially being underwater on our mortgage is hard to comprehend knowing how strong the housing market has been in Fairhope and it was the city's decision that will be impacting our homes.

1. Is there any discussion on potential plans to assist the homes will be greatly impacted if the substation is built?

Location Change
We were aware the city was discussing plans in 2019 for an electrical substation across the street in the ABC Store/Winn Dixie shopping center. Our understanding was plans had been (or were being) drawn, and we would expect to see it being built in the near future. We did also hear the location presented additional hurdles being near a retention pond, but there was never any indication from the city that there was a potential change in location. We then get a letter that we have basically a week to respond to a new location, which feels like a short turn around for this type of change in the community.

1. Please explain why the initial site was no longer acceptable and the need of putting it closer to residential homes makes sense.
2. What is the cost difference between the two locations?
3. Have there been any other sites proposed? If so, what are the costs of those proposed sites?

Health Concerns
Our basic knowledge of an electric substation installation is there are very strict requirements and regulations that will have to be met. Also, putting the lines underground helps reduce some of the radiation concerns since the ground soil helps absorb it. That is good news, but it still presents environmental risks to my wife and 11-month-old son knowing we will be living so close to this. We also have several families with kids ranging from approximately 6-13 years old in the neighborhood. These kids regularly play in and around the tree line that backs

up to this lot. The potential of having this so close to where they regularly play makes me as a parent very nervous. It would not take much for a curious kid to one time want to get a closer look and something very serious happens.

1. What safety precautions are going to be in place that will help minimize the risks for the number of homes that surround it?

Design/Size
We have yet to see a plan of what is being proposed by the city.

1. When will these be available for the public to see?
2. Does the city plan on using the entire 2+ acres?
3. Are you planning to clear the entire lot?
4. What is the expected timeframe for this to be built?
5. Is the site going to be used for anything else?

We are having a hard time understanding why the city believes this location makes sense. We would strongly encourage the city to continue looking for another location that would have no real impact on the tax paying members of your community. This location seems to be better for a small park or something that allows the characteristics of the land to remain in-place, since it is a beautiful piece of property.

We would also ask the city to be very transparent in keeping everyone informed as this process continues. The lack of information is concerning and we feel very caught very off guard by what feels like a quick decision.

We look forward to speaking with you at the hearing.

Sincerely,
Chris and Laura Wimmer
531 Salem Street

May 12, 2021

Hunter Simmons

Planning and Zoning Manager

City of Fairhope

Request: Special Exception

Case: BOA 21.07

Applicant: Fairhope Public Utilities

Property Located: 830 Morphy Avenue

Dear Hunter Simmons,

My name if Frank G. Lamia, I reside in the Hawthorne Glenn subdivision abutting the west side of the property noted above. I am voicing a strong objection to this special exception for the following reasons:

1) All property south of Morphy surrounding the proposed substation is zoned single family residential (R-3, PGH) and is currently developed as such. Plopping an industrial looking facility in the midst of this residential is just not thoughtful planning. Single family homes in Hawthorne Glenn will back up to it. When they bought their homes they were adjacent to other residential properties and had every reason to believe it would stay that way. Now they will be hearing and seeing an electrical substation.

2) If built I believe this substation will adversely impact property values for at least a portion of the homes in Hawthorne Glenn. It has to, who wants to live within view of this.

3) From a planning perspective the City should be looking for more commercial / industrial zoned sites for these facilities. This looks like not much long term master planning is being done to spot and acquire potential sites to accommodate utility growth. The solution should not be to force it into an established residential neighborhood.

We are hoping you will understand our concerns and help us protect our neighborhood and find another site.

Regards:

Frank G. Lamia

271 Hawthorne Circle

Fairhope, Alabama 36532

May 11, 2021

Board of Adjustments and Appeals

Honorable Members of the Board of Adjustments and Appeals,

My husband and I purchased our newly built home at 535 Salem Street in July 2016 and selected the house based on the location. The back of the lot adjoined almost 2 acres of undeveloped land (8300 Morphy Avenue) with a home located at the back of the property. We moved from an area in rural Tennessee that did not have zoning regulations. We understood that our property in Fairhope was zoned high density single family housing and believed this protected the property and the value of our home. We also understood that the property in back of us could be developed into home sites because of the zoning regulations. **We did not purchase our property thinking or believing the City of Fairhope would purchase the property at 8300 Morphy Avenue for an electrical substation.**

We respectfully request the Board of Adjustment and Appeals to deny this special exception for the following reasons:

1) Concern of the **potential health effects** from EMF's (electromagnetic fields) which are a form of radiation put off by power lines and substations. EMF's emitted by a substation can increase the risk of developing health problems such as cancer, illnesses with no determined cause, adrenal fatigue, hormone imbalance, insomnia, depression and anxiety.
2) **Reduction in property value**. Hawthorne Glenn is conveniently located to dining, shopping, and medical care. Since 2016 we have seen property values dramatically increase. Our home was purchased in 2016 for $246,000. Recent home sales for the same type of home reflect values of $342,000+. The construction of a substation directly behind our property will decrease our property value. **Any future sale of the property will be negatively impacted as the public perceives living next to an electrical substation as a health risk and an eyesore.** I have read that property values near a substation can decrease by as much as 40%. The overall property values for Hawthorne Glenn will decrease as this will affect all home owners.
3) **Decrease in the enjoyment of our property**. As previously stated, we did not buy our property believing a substation would be located in direct sight of our back yard. In addition to the sight concerns are noise and overhead power line concerns. We ask that you consider how you would feel if this happened to your property. **No one would want a substation in back of their property**.
4) We ask the Board of Adjustments and Appeals deny this change so the City Council can revisit **other sites located in commercial areas or locations away from high density single family homes**.
5) We ask the Board of Adjustments and Appeals to deny this change so the City Council can meet with residents to give **an overview of the project and how they propose to mitigate/eliminate the reduction of our property value, health concerns and loss of enjoyment of our property**.

One final observation. The City Council acted on buying property for this purpose without consulting residents who would be effected by this purchase and zoning exception. Since the property was purchased on April 12, through the date of this letter, we have had no communication from any City Council member or the City Mayor explaining their actions or supplying residents with an overview of the project and how they propose to mitigate the reduction of our property values, health concerns, and the loss of enjoyment

of our property. After a review of the minutes and agenda, I determined that no public discussion of this purchase took place whatsoever. The council just voted to ratify the council president's actions. I once again ask the members of the Board of Adjustments and appeals to deny this special exception. Today it is the residents of Hawthorne Glenn, tomorrow it will be you.

Respectively,

Kent and Malinda White
535 Salem Street
Fairhope, AL 36532

Baldwin County Parcel Viewer

Find address or place

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Layers

- Baldwin County Data
- Baldwin County Contours
- Baldwin County Imagery 2018

Legend

Find Address

Search

By Attribute By Shape

Select A Layer:

Parcels

Owner Name: (at least 3 chars)

Enter the name Smith, John

Parcel Number: (at least 3 chars)

05-23-02-09-4-401-004.000

PIN (Parcel Identification Number): (at least 1 chars)

1234

Search

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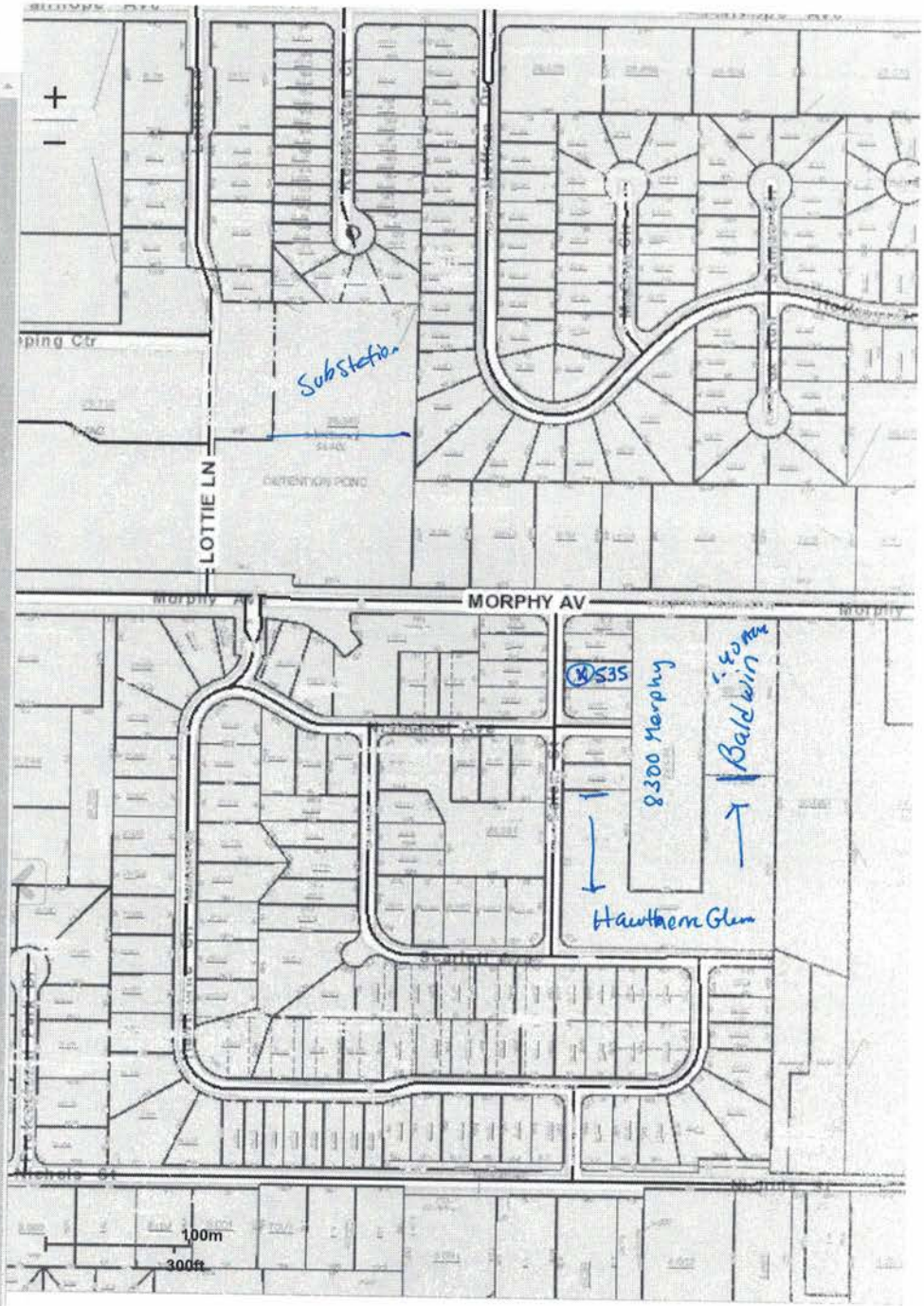
Markup

Street View

View the center of the map OR use the button to click on the map.

Google Maps

Hybrid Map



From: Roy Cannedy
To: Hunter Simmons
Cc: Qalert 311
Subject: Special Exception Request for 8300 Morphy Avenue
Date: Thursday, May 13, 2021 7:42:49 PM

I am writing in response to the letter dated May 5, 2021 pertaining to the Fairhope Public Utilities Special Exception Request for the property at 8300 Morphy Avenue.

I am a resident of the Hawthorne Glenn subdivision and am very disappointed with the city's decision to purchase this property with the intent to relocate and expand the electrical substation currently located on Fairhope Avenue. I have many questions and concerns regarding the choice of this parcel of land for this project, but I will highlight just a couple of those here.

(1) How would this project effect the safety and well being of the nearby residents?
There are two existing structures and many mature trees on this property and it is adjoined by several neighboring private homes. Isn't there an inherent fire risk that is associated with the operation of this type of equipment, and doesn't this regions unpredictable weather only heighten this threat? There is also concern of the additional EMF's that are generated by the components of this equipment. Studies have shown a link between these EMF's as being possibly carcinogenic and have been cited as a possible cause, in certain cases, of childhood leukemia.

(2) How would this project effect the aesthetic and, consequently, the property value of the nearby residents?
It may be one thing to drive by on Morphy Avenue and possibly not notice this at all but quite another when you see this every time you look out your kitchen window.

In stating my own personal view, why would this property which is in close proximity to schools, retail shopping, restaurants, Thomas Hospital, and many other places of business, and is in a residential neighborhood, not remain a residential property? I understand that the City of Fairhope and all of Baldwin County is experiencing tremendous growth at this time and that our city leaders are burdened with the tremendous challenges that are related to this growth, and I appreciate the time and effort and energy of all those involved, however, it is my hope that an alternative or perhaps existing location can be determined to be a better location for this project.

Respectfully submitted by,

Roy Cannedy
392 Scarlett Avenue

From: Trey
To: Hunter Simmons
Subject: Substation at 8300 Morphy Avenue
Date: Tuesday, May 11, 2021 2:38:40 PM

Mr. Simmons,

My name is Trey Canida, and I live at 522 Salem Street. I received the notice regarding the proposed substation to be built on 8300 Morphy Avenue.

I am sending this email to express my concerns with the proposal, and I plan to attend the meeting on May 17.

My concerns are mainly threefold. (1) diminution of property values (2) safety and (3) nuisance factor.

First, I would like to provide some background. The proposed substation will be directly behind my home. My wife and I have lived at this residence since November 2017. We welcomed our first child home in February 2020, and my wife is pregnant with our second child who is due in October. While all of us are lucky to live in a beautiful town like Fairhope. I fear that myself as well as my neighbors will be negatively impacted by this proposed substation being built directly behind our property. Specifically, there are five houses that share a boundary line with the property located at 8300 Morphy to the best of my knowledge. While living in Fairhope, I have seen my property value go up every year, and with the current state of the housing market, I know that property value would normally likely continue to go up. However, I can't help but be concerned that this proposed substation will diminish the value of my property as well as the property of my neighbors.

As I understand it, this substation was initially planned to be built behind or to the side of the ABC store in the Winn-Dixie shopping center. I understand that the substation was to be built at or near the current retaining pond that is located next to the ABC store, but that because of engineering surveys, additional costs were going to be a necessity to build up that property for the substation. I understand and appreciate the city's fiscal concern, and I am happy that the City does not want to expend additional funds when they feel they don't have to. However, I can't help but feel as if the City is instead passing those additional costs on to myself and my neighbors by building this substation directly behind our property, which will certainly cause a diminution in the value of our properties. Whether there is any truth to any safety or health concerns or nuisance factors, the ordinary person has concerns about living directly next to an electrical substation. The proposed substation would probably be less than 100 feet from my backyard. Due to this fact, I imagine my wife and I will lose property value in our home, and the resale value of the home will be affected.

Second, while I have no specific knowledge about any safety concerns regarding living in close proximity to an electrical substation. This is a matter that greatly concerns me. I would like to hear more from the city about any safety issues that might arise from having my wife and (soon to be) two small children living so close to an electrical substation. I'm certain that Fairhope Utilities has reviewed studies and/or has more information about this concern which

I am sure is shared amongst my neighbors.

Third, nuisance factor. I have heard anecdotal stories about loud humming noises emanating from electrical substations such as the one that the City is proposing to build next to my property. Again, this is something I hope Fairhope Utilities could provide more information about before Planning and Zoning makes their final decision.

When all of these factors are considered, I can't help but wonder why a better location cannot be found for this substation. Is it really necessary to build this substation so near a subdivision and multiple single family homes? Is there not a better, less populated and/or business zone where this could be built. I feel as if the location by the ABC store would have been a substantially better location for this proposal. Again, while I appreciate the City's fiscal concerns concerning that location, I hope the city will also appreciate the concerns that are shared amongst myself and my neighbors if this electrical substation is built right next door to our property. I would hope that anyone who has a vote or a voice in deciding whether this zoning variance is granted would consider how they would feel if the variance was in their own backyard.

Finally, I think I speak for myself and many neighbors when I say that we would like this process to be more well informed. As I understand it, plans are being drawn up regarding the engineering of the site, the placement of the substation, and the landscaping and layout of the proposed substation. I urge the Planning and zoning Commission to hold off on making any decision until such plans are made public and are available for review.

Thank you for your time, and I look forward to the meeting Monday night.

Thanks,
Trey and Amanda Canida
522 Salem Street

From: Wilma Castillo
To: Hunter Simmons
Subject: Regarding 8300 Morphy Ave.
Date: Thursday, May 13, 2021 4:13:36 PM

To whom it may concern:

I, Wilma Castillo, residing at 538 Salem St in the Hawthorne Glen II subdivision, ask that no electrical substation be built on the property at 8300 Morphy Ave. The current zoning is residential, myself and my neighbors would like it to remain so. This is in part out of potential concerns of negative effects on the health of people living nearby, and in part out of concern for the property value impacts. Especially among those who would be nearest to the property, are those who have very young children. For all of us living in this neighborhood, the property value concern is particularly troubling. We purchased homes here in this neighborhood, in this city, believing that the adjacent land would remain residential except for where businesses were already established. If the property at 8300 Morphy Ave. becomes an electrical substation area, it will make our homes considerably more difficult to sell should we decide to sell them. We would much rather continue to live in a Fairhope that doesn't think it appropriate to put an electrical substation so close to our homes. We would greatly appreciate it if another location, one not bordered by homes and families, be used for an electrical substation.

Thank you for considering our voices in this matter,

Wilma Castillo