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## Report No. ENX515a

# Northeast Business Park EIS Energy Report

Developer: Northeast Business Park Pty Ltd


Report Approval:
Phil Perkins
Managing Director
Lectel Consulting

Report Manager:
Peter Berry
Operations Manager
Lectel Consulting



Approved for issue: P. Perkins

Revision 3 (Revised Draft)

Date 25/09/2007

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# 1. INTRODUCTION

This report has been prepared in response to Laing O'Rourke's request, on behalf of Northeast Business Park (NEBP) Pty Ltd, for consultancy services regarding their planned NEBP development.

NEBP is a mixed-use marina and business park project that will combine marina facilities, business & industry, commercial, residential, heritage and recreational parklands precincts in a sustainable riverside development on the Caboolture River. Encompassing 793 hectares of multi-use precincts, of which roughly 350 ha will be developed, NEBP seeks to incorporate clusters of mixed and complementary industry and businesses, underpinned by a high quality residential development, and a state of the art marina and marine industries precinct.

Supporting infrastructure associated with the NEBP development will require upgrading, and in some cases extensions to existing infrastructure will be necessary. Proposed improvements to infrastructure include additional sewerage and electricity provisions and internal roads through the development to service industrial and commercial precincts.

This report has been written to address items 3.7.2 and 3.7.6 in the NEBP project Terms of Reference, and to explore the environmental impact of Energy and Communications recommendations proposed in the Contestability Report also written by Lectel (report ENX515b).

In April 2006 Lectel prepared a Concept Electrical Report (reference ER443) to which this report is intended as a further development, focusing more specifically on environmental issues.

NEBP Pty Ltd will be submitting their Environmental Impact Statement (EIS) to the Queensland Government in August 2007 (date to be confirmed) which requires inputs from an electrical / telecommunications consultant, as detailed in this report.

# 2. SCOPE OF WORKS

This report is to be read in conjunction with the electrical layout plan (refer Appendix 1).

## 2.1 REPORT

This report and appendices outline the results of liaison with Energex, Origin Energy, Telstra, Uecomm and other relevant parties and includes the following key issues:

- Details of proposed 33kV zone substation site
- Development electrical layout, including possible locations of Padmount Transformers (PMTs), conduit & cable routes
- 33kV external works required to supply the development
- Impact on existing 11kV Electricity Network
- Zone substation planning status and requirements
- Gas and telecommunications routes and methods of installation
- Existing and proposed easements
- Possible disturbances to vegetation, watercourses and the natural environment in general
- Conflicts with existing infrastructure, including road, rail, pipelines, bridges, tracks, paths, power and communications networks and wireless services
- Visual impacts
- Noise from installed equipment
- Electromagnetic radiation (EMR)
- Estimated timing of stages for electrical and telecommunications construction
- Legalities of joint-use trenches and conduits with other telecommunications carriers or for private networks.

## 2.2 CONCEPTUAL DESIGN

The existing AutoCAD electrical conceptual design plan for the development (refer Appendix 1) has been further refined to indicate preferred zone substation location, high voltage underground network & gas routes and telecommunications points of presence (internal and external to the development). To support this, Lectel performed the following tasks:

- Obtained current records of existing services from all relevant authorities
- Obtained electronic base plans & supporting information from the client (including lot layout)

- Undertook site visits to verify existing conditions and likely conflict points (with existing infrastructure)
- Further liaised with Energex & Origin Energy for design parameters & supply issues
- Liaised with Telstra and Uecomm for design parameters and planning
- Performed voltage drop calculations to roughly plan numbers and locations of PMTs
- Drafted refinements to the AutoCAD concept electrical design showing preferred zone substation location, HV backbone network, and telecommunications points of presence and proposed gas routes for the entire development.

# 3. ENVIRONMENTAL IMPACTS

## 3.1 ELECTRICAL

**HV Transmission**

*11kV Network*

The initial electricity supply requirements for the first stages of NEBP can be provided from the existing overhead 11kV networks in both Nolan and Buckley Rds.

The Energex preference would be for an overhead network extension to the site, however they seek to comply with Council development conditions regarding the type of construction required. If underground construction is requested, trenching and light vegetation clearing may be required, especially along Buckley Rd, pending other road upgrades due to the development. Upgrade of existing overhead 11kV networks is also possible, which may require heavier grade poles and/or cables.

*Photo 1 (Left): Nolan Dr, looking South (NEBP site is on the left).*
*Photo 2 (Right): Buckley Rd, looking North (NEBP site is straight ahead).*

*33kV Network*

The next phase of electrical supply will likely be via new 33kV Feeders, installed in advance of a new zone substation. These feeders will be used to augment the capacity of existing 11kV network until the zone substation is commissioned. New feeder routes will be at Energex's discretion but likely to be from existing Energex substations both at Morayfield North (Dickson St) and Morayfield South (cnr Robbs & Lindsay Rds).

Refer to Appendix 1 for suggested corridors of installation of new 33kV distribution lines as discussed with Energex planning staff. Energex policy cites preference for routes requiring easements to go through commercial and industrial areas, crown land and open spaces over those which depend upon easements through sensitive areas such as urban residential, schools, community areas or sensitive environmental areas.

Again, due to cost, Energex's preference would be for a combination of overhead and underground construction, but Energex will comply with Council development conditions regarding desired type of construction. Existing 11kV overhead feeder routes in Morayfield have been built with provision to add 33kV cable at the top of the poles (refer photo 3).

All new feeders to the development site are likely to be on the electricity alignment along gazetted roads with no easements required. Additional conduits will need to be installed in the footpath especially in the vicinity of the new substation.

We have confirmed, from Energex maps, that no empty conduits exist across the Bruce Hwy either at Buchanan Rd or Coach Rd, so underground directional drilling would likely be required at these locations.

No other conflicts have been identified with other infrastructure or natural features.

*Photo 3 (above): 11kV network Graham Rd Morayfield. Pole height suitable for addition of 33kV*

Note also that plans are underway however for widening of the Bruce Hwy Bridge across the Caboolture River which will include additional utility conduits, which give Energex another option for supply of HV to the site from their bulk supply substation on the corner of Jensen and Elof Rds, Caboolture.

*Easements*
All 33kv routes will require a two metre wide easement, preferred to be under the road.

Energex have also specified that they require two metre wide easements inside group title areas, only along routes connecting to 11kV and/or LV networks feeding customers external to the NEBP development. Although these easements will be in favour of Energex assets, the only limitation imposed by such an arrangement is that no joint-use configurations directly above 11kV cables can be considered along these routes. Other utilities are allowed to use the easement as long as clearance distances are observed (typically 300mm minimum) and underground PVC cover plates are utilised in 11kV trenches to protect the cables. Generally Energex will adopt a 0-900mm alignment within this easement.

For routes only feeding NEBP internal customers no easement is required and Energex will either adopt a 0-900mm alignment from property boundary or be located 1m from the back of kerb. Consistency of alignment is required throughout the development."

**Zone Substation**
An Energex modular 33kV zone substation will be required to supply the anticipated ultimate electrical load of NEBP. Energex have already conceptually planned for a new zone substation in the general area of the development. Lectel have conducted further discussions with Energex planning staff re: proposed sites, to meet all Energex criteria including the location being central to other areas and above required flood levels (refer Appendix 1).

*Photo 4 (above): Example 33kV zone substation.*

*Visual Impact*
Minimal visual impact is anticipated for installation of the zone substation and minimal cost would be required to reduce that impact, if required, through the provision of additional screening/fences and or additional landscaping.

*Noise Impact*
Minimal noise impact is anticipated. Equipment does emit a low audible hum, but sited next to a commercial development would not cause any disturbance. Noise control could be facilitated with minimal cost by use of with noise enclosures/landscaping, provision of low noise transformers or consideration of a slightly bigger site to gain additional distance.

*EMF*
The proposed zone substation has expected readings of 0.5-3 milligauss at the fence (less than the emissions close to a desktop computer). Corner sites are preferred to reduce the EMF impact as this allows cable separation to be increased. The fields surrounding the substation and powerlines are only a small fraction of National Health and Medical Research Council (NHMRC) limits of exposure, and are not considered a risk to the public or the environment. Refer to Appendix 6 for a detailed analysis.

*Conflicts with other assets*
The proposed substation site it not to contain any easements over it (excluding electrical). Other infrastructure services (e.g. rising mains, etc) are required not to run along the substation front property boundary, although if not feasible, extra depth may be required to allow for cable ingress and egress.

No other conflicts of services have been identified.

*Energex are required to complete their own environmental studies as part of the planning of new substations.*

*Contingency*
The initial electricity supply requirements for the first stages of NEBP, due for energisation in 2009, can be provided from the existing 11kV network in Nolan and Buckley Rds. However this part of the high voltage network does not have adequate supply capacity for future stages and, even if they were to be upgraded, will not have adequate capacity for more than the initial stages of the development.

The anticipated ultimate electrical load of NEBP at 24-27MVA will require the establishment of a new Energex 33kV zone substation.

Energex may supply bulk electricity to NEBP in several stages, using any or all of the following methods at their discretion

- Use existing 11kV HV supply adjacent to the site (Energex are yet to advise existing capacity);
- Upgrade existing 11kV HV infrastructure (to increase capacity);
- Installation of new 33kV HV feeder cables (prior to zone substation), but used to supply 11kV only (can increase capacity up to 8MVA);
- Installation of new 33kV zone substation.

Energex have advised a lead time of 2 years from resolution of property issues (i.e. purchase of the required land) to zone substation operation. On the information provided we anticipate that to be between June 2010 to 2011 but is also very dependant on customer demand and development progress. Note also that no upgrading of the existing infrastructure has been planned yet pending a decision on the future substation, however Energex are confident that the above contingency will not allow any shortfall in supply to the development.

*Internal Reticulation*

Whether the internal electricity reticulation and street-lighting be privately owned or an Energex network, HV and LV underground cables will be required to be installed throughout NEBP. Numerous 125mm conduits and PMTs will be required at intervals throughout NEBP. If the development is community titled, minimum 2m wide easements are required for the electrical network assets along the footpath, otherwise they must be on road reserve.

*Photo 5 (left): Example street electricity and street-lighting network.*
*Photo 6 (right): Example Energex Pad-mount Transformer (PMT).*

Depending on customer loads, one PMT may be required per commercial/industrial property, whereas a single PMT can supply up to 120 residential customers. In industrial/commercial precincts, PMT sites are required every six lots, though not all sites will have a PMT installed initially to allow for future growth – during initial development, a PMT is installed every fifteen lots.

A summary of electrical loading estimates is shown in Appendix 3 and note that gas reticulation reduces the planning requirements of an Energex network.

Each PMT requires a road reserve allocation of 3.5 x 4.1m, or a slightly larger area for sloping ground to accommodate retaining walls. An earth grid is also required, that can either be contained either within the standard road reserve allocation or be as large as 11.9 x 8.3m, pending current rules and regulations, and may impact on what building can be erected on that lot. Additionally, Energex require conduits along each side of the road, including cul-de-sacs.

PMTs generally contain a small amount of oil sealed within them to assist with cooling, and sites are designed with bunding to contain spills in the rare event of a leak. Energex takes all precautions to ensure PMTs provide little to no environmental impact caused by ground contamination.

Lectel recommends the installation of an Energex fully-owned HV and LV network throughout the development, for the following reasons:

- Electricity is an essential service and Energex have the best network maintenance and service restoration capability. However they will only maintain their own network.
- An electricity network built to Energex standards is the cheapest option to install, due to
    - Energex capital contributions for construction (at present, refer page 4);
    - Less cable and smaller cable sizes required for Energex standards;
    - Lower cost protection requirements.
- An electricity network built to Energex standards is the cheapest option to operate, due to no ongoing costs for administration, maintenance and upgrades (of resultant losses for on-selling of power. Refer to Appendix 6 for cash flow estimate).

- Flexibility is retained by the BC to install energy efficient buildings and/or sustainable electricity generation sources within the development to maximise use of 'feed-in tariffs' (i.e. surplus energy contributed back into the electricity grid).
- Minimise use of unusual lot layouts and non-standard cable routes.

Master planning needs early consideration of ongoing consultation with the Energex property section contact, Shannon O'Connell (Property Program Manager), via email shannonoconnell@energex.com.au, in regards to the zone substation site.

### 3.2 GAS

Natural gas produces the least amount of carbon dioxide of all fossil fuels. Using clean burning natural gas significantly reduces the impact of the Greenhouse Effect on the environment, furthermore, it is produced, piped and delivered using rigorous environmental and safety standards throughout the entire industry.

Proposed uses for Natural Gas:

- Hot water – natural gas heaters provide and endless flow of hot water, heating water only as required.
- Cooking – provides economical & instant, clean visible heat.
- Outdoor Heating – Domestic gas connection to barbecue, Pool & spa heating, Patio heating & post, wall or pier mounted lighting.

Envestra is the owner of the natural gas distribution network north of the Brisbane River and is committed to making this environmentally friendly fuel available to residential and business consumers in South East Queensland by extending its network in accordance with the National Third Party Access Code for Natural Gas Pipelines. To satisfy the economic prudency test for natural gas distribution networks and ensure Envestra's compliance with the Code, network expansion decisions require detailed evaluation to develop connection, volume and revenue growth forecasts, and determine the regulated rate of return on proposed investment.

Lectel has recommended the installation of a gas network throughout the development, for the following reasons:

- Gas handling is a dangerous, high specialty service and Origin/Envestra has the best local network maintenance and service restoration capability. However they will only maintain their own network.
- Origin offer free customer connections in some circumstances to help offset the cost.
- Gas reticulation allows relaxation of Energex standards for peak demand loading of the network, allowing fewer PMTs and lower cable demands and thus lower construction cost.
- Future implementation of the Queensland Government 'ClimateSmart 2050' policy will require greater use of gas or solar energy, especially for hot water systems. Refer to http://www.thepremier.qld.gov.au/news/initiatives/climate/index.shtm.

Supply of wholesale gas, possibly at discounted rates, is a less attractive proposition to Origin/Envestra and may either increase the contribution towards extending the pipeline to the development or reduce the feasibility of the extension altogether.

The nearest natural gas infrastructure is located at Narangba, approximately 7km from the NEBP development site. Envestra have supplied preliminary plans to extend a pipeline further north to the NEBP development, meaning the availability of reticulated gas within the development will allow Energex to reduce electrical planning by 500W per household, potentially requiring less HV cabling and PMTs.

Following an enquiry from Laing O'Rourke regarding the availability of natural gas supply to the North East Business Park at Burpengary, Envestra have supplied preliminary plans to extend a pipeline further north to the NEBP development, meaning the availability of reticulated gas within the development will allow Energex to reduce electrical planning by 500W per household, potentially requiring less HV cabling and PMTs.

The process required to evaluate natural gas expansion to the North East Business Park involves;

- Survey of possible pipeline routes to optimise connection potential and network utilisation
- Select preferred pipeline route
- Prepare detailed connection and volume demand forecasts
- Submit information to Operations group for system design and cost estimation
- Undertake economic evaluation to determine viability of proposed network expansion, and in the event project does not satisfy the economic hurdle rate, determine developer contribution required to overcome shortfall and make gas supply economic
- Provide indicative response detailing results of evaluation

### 3.3 TELECOMMUNICATIONS

Telstra are currently mandated to provide a copper cable telephone network (PSTN) in all new developments, free of charge to the developer except for the cost of trenching and any possible civil headworks. Although the PSTN will be fully owned by Telstra, other service providers are able to resell their services across it. The copper network also supports broadband data transmission via ADSL technology.

Any carrier, however, may be approached to supply a service, usually at a cost, and the best alternative to a PSTN is an optic fibre network. Lectel have liaised with Uecomm/Fujitsu and Pivit in regards to a private telecommunication network option and also with Telstra Smart Community regarding a Telstra owned optic fibre network.

Regardless of the service provider or type of network, all telecommunications cabling will be underground and jointed within in-ground pits. Optic fibre networks have no above-ground features. Copper reticulation network within the development however is distributed from pillars cabled back to CMUX cabinets which link back to the telephone exchange via optic fibre cable. Both items would be located on the road reserve throughout the development.

Telstra plans show adequate existing conduits and optic fibre cable available in the vicinity of the development. All new telecommunications cabling must be underground, so some trenching may be required leading up to the development. Within the development, telecommunications conduits generally share a 'joint-use' trench with electricity conduits, in which electricity providers allow up to two 100mm telecommunications conduits. Telecommunications carriers generally won't share a conduit, however especially with the small size and large capacity of optic fibre cables, 2 separate conduits provide the option for 2 separate telecommunications networks. Other conduits may also be installed if required, but would have to be on a separate alignment to electrical services.

No environmental impacts are identified by extending telecommunications services to Northeast Business Park or subsequent reticulation.


*Photo 7 (left): Example Telstra Pillar.*
*Photo 8 (right): Example Telstra CMUX Cabinet.*

The area should receive adequate mobile phone coverage from Telstra, Optus and Vodafone repeater stations along the highway as well as wireless data coverage from existing base stations. The area is also located within the Austar satellite digital pay TV footprint for pay TV services.

If a 'smart community' or private telecommunication network is built, then a clean roof policy may also be enabled as all telecommunications receiving equipment could be housed in a common room in a community building, e.g. the golf club house.

Future-proofing Northeast Business Park will require the installation of a private telecommunications network.

Services delivered will include:
- Free to air television (analogue and digital)
- True broadband Internet services including web browsing, web hosting and email services from 256kbps to 1mbps and beyond
- Multiple telephone services, PSTN & ISDN
- Free community (internal) calls
- Intercom telephone services
- Pay TV services – Video-on-demand services
- Community portal
- Wireless hotspots in key public areas
- Smart Home & Environmental Management
- Health Care
- Community Access Control System (keyless)
- Security Services including alarm monitoring, camera viewing and recording options

Lectel has recommended the installation of both a private optic fibre telecommunications & Telstra copper networks throughout the development, for the following reasons:
- Control over delivery of rapidly changing technology.
- Greater variety of services offered.
- Flexibility of options to manage operation and billing.
- Ability to integrate with other utilities and services within the development.
- Customisation of network and content unique to NBP.
- Access to Telstra services (including analogue data, such as EFTPOS)

Lectel strongly recommends further consultation with telecommunications carriers and service providers, either those listed above or others to determine the best arrangement to suit budgets and service delivery requirements.

## 4. SUSTAINABILITY

Sustainability of resources, especially energy resources, is a highly specialised and currently a very topical subject. The Queensland Government is currently proactive in addressing climate change, with initiatives and support offered for sustainable living, contained within their ClimateSmart 2050 program.

As climate change is likely to impact further on already stressed water resources record investment is underway to reduce energy consumption and overall emissions. For more information refer to http://www.thepremier.qld.gov.au/news/initiatives/climate/index.shtm

Initiatives include greater use of natural gas, wind, hydrogen fuel cells and emerging technologies such as geothermal and solar thermal technologies.

Current technologies ready to be employed within developments include water treatment on site, solar power, tidal flow pumps, greenhouse-friendly hot water systems, building insulation and compact fluorescent lamps.

Solar panel systems on buildings may produce more power than a building requires, so a feed-in tariff can pay for energy contributed back to the electricity grid. In addition the federal government has implemented a Photovoltaic Rebate Program to assist with the cost of installation. Solar panel technology is rapidly reducing the cost of these items with the possibility that in the near future the government rebate may cover 100% of the cost.

The state government has already set a renewable and low-emission energy target of 6% by 2015, increasing to 10% by 2020, which will obviously impact on some construction within Northeast Business Park.

This target is designed to optimise investment, especially by enterprise energy users, in renewable energy such as solar hot water systems, solar photovoltaic cells, wind, geothermal, biomass (e.g. the

waste decomposition) and landfill gas projects. The projected program outcomes include savings in customer energy costs and water consumption.

The Industry Smart Energy Savings Program also requires all new commercial buildings in Queensland to reach a minimum four-star energy efficiency rating by 2010 under the Australian Building Greenhouse Rating scheme.

New houses are now required to install greenhouse-friendly hot water systems. As the average Queensland household uses 35 per cent of its energy to heat water, using non-electric systems for water heating is an effective means of reducing greenhouse gas emissions and reducing household electricity requirements. The government is currently providing rebates for gas and solar replacement systems.

Lectel has contacted some leading experts in this area as the scope of sustainability is huge, and we would be happy to pursue the subject further under a separate commission.

## 5. ABBREVIATIONS

| | |
|---|---|
| A | Ampere (Unit of electric current) |
| ADMD | After Diversity Maximum Demand |
| CDS | Construction Detail Sheet (or Fax) |
| CMEN | Common Multiple Earth Neutral |
| CMUX | Customer Multiplexer |
| CoA | Certificate of Acceptance (Subdivision Supply Acceptance) |
| CoC | Certificate of Completion |
| CoS | Certificate of Supply |
| EMF | Electric and Magnetic Fields |
| EMR | Electromagnetic Radiation |
| HV | High Voltage – 11,000V + supply |
| kV | KiloVolt (1000V) |
| kVA | Kilovolt-Amp (1000 VA – same as kW 'Kilowatt' for power) |
| LATM | Local Area Traffic Management |
| LV | Low Voltage – 240V supply |
| NEBP | Northeast Business Park |
| OH | Overhead |
| PMT | Pad-Mount Transformer |
| PSTN | Public Switched Telephone Network |
| PT | Pole Transformer |
| RMU | Ring Main Unit (3-way manual switching option for T-junction) |
| RPEQ | Registered Professional Engineer Queensland |
| SESA | Subdivider's Electricity Supply Agreement |
| SL | Street-Light |
| SWP | Standard Work Procedure (An ENERGEX specification) |
| UDC | Underground Distribution Construction |
| UG | Underground |
| URD | Urban Reticulation Development (incl UG, OH and SL) |
| V | Volt (Unit of electric potential) |
| W | Watt (Unit of power) |

# Appendix 1 - Electrical Concept Layout Plan

(Refer separate plan)

# Appendix 2 - Contact Details

| Service Provider | Phone | Web |
|---|---|---|
| AGL (electricity retailer) | 1300 309 327 | www.agl.com.au |
| Dept of Communications, Information Technology & the Arts | 02 6271 1000 | www.dcita.gov.au/tel |
| Energex | 13 12 53 | www.energex.com.au |
| Envestra | 08 8227 1500 | www.envestra.com.au |
| Lectel | 07 5431 6900 | www.lectel.com.au |
| Origin Energy (Gas) | 13 24 61 | www.originenergy.com.au |
| Telecommunications Industry Ombudsman | 1800 062 058 | www.tio.com.au |
| Telstra – Smart Community | 07 3221 1296 | www.telstrasmartcommunity.com |

# Appendix 3 - Electrical Loading Estimates (Summary)

| Item | Type | Loading Estimate (kW or kVA) / unit | No. | Total Load (MW) | Comments |
|---|---|---|---|---|---|
| 1 | Industrial Lots | 30 | 308 | 9.3 | 500kVA PMT / 15 lots |
| 2 | Commercial Precinct | 30 | 30 | 0.9 | |
| 3 | Residential Lots | 4.5 | 1168 | 5.3 | |
| 4 | Multi-residential (apartments) | 4.5 | 816 units | 3.7 | |
| 5 | Townhouses / Medium-density | 4.5 | 317 | 1.5 | |
| 6 | Hotel / Conference Centre | 4.5 | 200 room | 0.9 | |
| 7 | Golf Club | 500 | 1 | 0.5 | |
| 8 | Golf Courses | 100 | 2 | 0.2 | |
| 9 | Marina | 2.5 | 912 berth | 2.3 | |
| 10 | Marina commercial precinct | 1000 | 2 | 2.0 | |
| 11 | Lighting | 0.05 (av.) | 500 | 0.3 | |
| Total | | | | **26.9** | ±30% |

# Appendix 4 - Electrical Loading Estimates (Detailed) and Timing

| Element | Description | Estimated Load (kVA) | Map Ref | Jun '09 | kVA | Jun '10 | kVA | Jun '11 | kVA | Jun '12 | kVA | Jun '13 | kVA | Jun '14 | kVA | Jun '15 | kVA | Jun '16 | kVA | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shipyard | Beside Marina | 200 | 3 | 0% | 0 | 0% | 0 | 100% | 200 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Marina | 912 berth | 2300 | 13 | 0% | 0 | 10% | 230 | 10% | 230 | 10% | 230 | 20% | 460 | 20% | 460 | 30% | 690 | 0% | 0 | 100% |
| Marine Industry | Hardstand | 500 | 2 | 0% | 0 | 50% | 250 | 50% | 250 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Industrial Precinct | Bus'n. Park 308 lots | 9200 | 1 | 45% | 4140 | 10% | 920 | 20% | 1840 | 0% | 0 | 25% | 2300 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Bulky Goods | 55,000 m2 | 100 | 1 | 23% | 23 | 60% | 60 | 0% | 0 | 0% | 0 | 17% | 17 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Local Retail | | 500 | 1 | 0% | 0 | 40% | 200 | 60% | 300 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Commercial & Business | | 900 | 1 | 0% | 0 | 32% | 288 | 20% | 180 | 0% | 0 | 48% | 432 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Residential Riverfront | 212 lots | 954 | TBA | 0% | 0 | 0% | 0 | 20% | 191 | 0% | 0 | 30% | 286 | 0% | 0 | 20% | 191 | 30% | 286 | 100% |
| Residential Dry | 418 lots | 1881 | 10 | 0% | 0 | 0% | 0 | 24% | 451 | 0% | 0 | 36% | 678 | 0% | 0 | 20% | 376 | 20% | 376 | 100% |
| Residential Golf Course | 371 lots | 1669 | 9 | 0% | 0 | 0% | 0 | 15% | 250 | 22% | 367 | 0% | 0 | 0% | 0 | 26% | 434 | 37% | 618 | 100% |
| Residential Golf Course MD | 42,000 m2 | 500 | 8 | 0% | 0 | 0% | 0 | 20% | 100 | 20% | 100 | 20% | 100 | 40% | 200 | 0% | 0 | 0% | 0 | 100% |
| Residential Golf Course HD | 25,000 m2 | 1000 | 11 | 0% | 0 | 0% | 0 | 0% | 0 | 50% | 500 | 0% | 0 | 50% | 500 | 0% | 0 | 0% | 0 | 100% |
| Hotel | Conf Centre 200 rm | 900 | 5 | 0% | 0 | 0% | 0 | 0% | 0 | 100% | 900 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Mixed Use Commercial | Supermarket/Shops | 1000 | 4 | 0% | 0 | 0% | 0 | 30% | 300 | 30% | 300 | 0% | 0 | 40% | 400 | 0% | 0 | 0% | 0 | 100% |
| Retail/Golf Club | | 500 | 6 | 0% | 0 | 0% | 0 | 15% | 75 | 15% | 75 | 0% | 0 | 42% | 210 | 28% | 140 | 0% | 0 | 100% |
| Marina Residential | 85 units | 390 | 6 | 0% | 0 | 0% | 0 | 0% | 0 | 60% | 234 | 40% | 156 | 0% | 0 | 0% | 0 | 0% | 0 | 100% |
| Marina Residential HD | 30,000 m2 | 1000 | 14 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 35% | 350 | 0% | 0 | 65% | 650 | 0% | 0 | 100% |
| Lighting | 500 | 300 | | 10% | 30 | 15% | 45 | 15% | 45 | 15% | 45 | 15% | 45 | 10% | 30 | 10% | 30 | 10% | 30 | 100% |
| | | 23794 | | | 4193 | | 1993 | | 4412 | | 2751 | | 4823 | | 1800 | | 2511 | | 1310 | 23794 |
| By Precinct | | | | | | | | | | | | | | | | | | | | |
| Precinct1 | | 7220.0 | | | 4163.0 | | 1468.0 | | 2320.0 | | 0.0 | | 2749.0 | | 0.0 | | 0.0 | | 0.0 | |
| Precinct2 | | 500.0 | | | 0.0 | | 250.0 | | 250.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Precinct3 | | 200.0 | | | 0.0 | | 0.0 | | 200.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Precinct4 | | 1000.0 | | | 0.0 | | 0.0 | | 300.0 | | 300.0 | | 0.0 | | 400.0 | | 0.0 | | 0.0 | |
| Precinct5 | | 900.0 | | | 0.0 | | 0.0 | | 0.0 | | 900.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Precinct6 | | 890 | | | 0.0 | | 0.0 | | 75.0 | | 309.0 | | 156.0 | | 156.0 | | 210.0 | | 0.0 | |
| Precinct7 | | 0.0 | | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Precinct8 | | 500.0 | | | 0.0 | | 0.0 | | 100.0 | | 100.0 | | 100.0 | | 200.0 | | 0.0 | | 0.0 | |
| Precinct9 | | 1669.0 | | | 0.0 | | 0.0 | | 250.4 | | 367.0 | | 0.0 | | 0.0 | | 434 | | 617.6 | |
| Precinct10 | | 1881.0 | | | 0.0 | | 0.0 | | 451.4 | | 0.0 | | 677.0 | | 0.0 | | 376.3 | | 376.3 | |
| Precinct11 | | 1000.0 | | | 0.0 | | 0.0 | | 0.0 | | 500.0 | | 0.0 | | 500.0 | | 0.0 | | 0.0 | |
| Precinct12 | | 0.0 | | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Precinct13 | | 2300.0 | | | 0.0 | | 230.0 | | 230.0 | | 230.0 | | 460.0 | | 460.0 | | 690.0 | | 0.0 | |
| Precinct14 | | 1000.0 | | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 350.0 | | 0.0 | | 650.0 | | 0.0 | |
| Residential Riverfront | | 954.0 | | | 0.0 | | 0.0 | | 190.8 | | 0.0 | | 286.2 | | 0.0 | | 190.8 | | 286.2 | |
| Lighting | | 300.0 | | | 30.0 | | 45.0 | | 45.0 | | 45.0 | | 45.0 | | 30.0 | | 30.0 | | 30.0 | |
| | | 23794 | | | 4193 | | 1993 | | 4412 | | 2751 | | 4823 | | 1800 | | 2511 | | 1310 | 23794 |

# Appendix 5 - Energex Zone Substation & HV Transmission Information

*Distributors*

There are 3 electricity distributors in Queensland, namely Energex, Ergon Energy and Country Energy. These distributors own, operate and maintain the electricity system that delivers electricity to business and homes. It is not possible to choose your distributor; that is determined by geographic area. Similarly it is not possible to become your own electricity network provider or to maintain ownership of the electricity assets. The electricity distributor for NEBP is Energex Pty Ltd.

The anticipated ultimate electrical load of NEBP at 21MVA will require the establishment of a new Energex 33kV zone substation. The nearest other substations are located at the corner of Robbs and Lindsay Rds Morayfield (AKA Morayfield substation) & Dickson Rd Morayfield (AKA Morayfield North substation). A bulk supply substation also exists on the corner of Jensen and Elof Rds Caboolture. Energex may extend 33kV cable from any, or a combination, of these sites to a new zone substation.

*Photos: (Left) Morayfield North 33kV zone substation.*
*(Right) Caboolture bulk supply zone substation*

*Site Overview*

Substations are strategically located as close as practical to large electrical load centres and perform an integral part of the electrical distribution network converting 33,000 volt sub-transmission to the 11,000 volt distribution network.

Energex have already conceptually planned for a new 33kV zone substation in the general area of Northeast Business Park. Lectel have conducted further discussions with Energex planning staff who consider our proposed site, on the western side of NEBP, as ideal as it meets all Energex criteria including the location being central to other areas (refer Appendix 1).

*Site Requirements*

- The site must be above the Q100 flood line;
- Site access and roadway to site should not be prone to local flooding. Sensitive electrical equipment is to be sited above the 1 in 200yr flood level (Q200);
- Preference for industrial area and to avoid proximity to schools, old age homes, hospitals, high density neighbours;
- Preferred shape rectilinear, corner site;
- Area required:
  - Corner site - 75m x 50m - 3750m2 (min), or
  - landlocked - 75m x 55m - 4125m2 (min)
- No encumbrances on site (i.e. buildings, poles, towers, dumped fill etc);
- No contamination caused by previous/existing uses including dump site, storage site of questionable material, service stations, etc;
- No natural overland flow path evident;
- Natural and adjacent vegetation - around the inside perimeter of the site may be acceptable that may provide a natural screen for a potential substation;
- Safe access required:
  - 40-70k/hr (speed limits) – clear vision in each direction for a minimum of 100m.
  - 70-100k/hr (speed limit) – clear vision in each direction for a minimum of 200m.

- Cross fall/gradient across site 1-1.5m falling toward road.

*Cost*
The Energex cost for such a substation represents a minimum of several million dollars expenditure depending on the size of the substation, infrastructure upgrading required, sub-transmission costs and is normally deferred until absolutely required. A minimum of 2 years is required for a new substation to be operational. All substation and headworks costs are borne by Energex. However if Energex's decision is to build overhead construction for cost savings, and NEBP want underground construction, NEBP may be required to fund any difference between overhead and underground construction. Energex will however comply with all council requirements for method of infrastructure construction.

Energex also purchases the whole of the zone substation property at market rates.

# Appendix 6 - EMF (Electric & Magnetic Fields) Information

Electric and magnetic fields (EMF) are produced wherever electricity or electrical equipment is in use, including overhead and underground cables.

Anything with electric current flowing through produces EMF, such as powerlines running from the street to your home, the home wiring system, electrical appliances and especially high voltage distribution lines.

Magnetic fields associated with powerlines depend on the amount of current flowing along the line and the distance from the line. Fields rapidly decrease in strength with distance, therefore inside a house, magnetic fields from nearby powerlines is usually similar to that from wiring and appliances.

The following table shows typical magnetic field strengths from a number of common sources, including powerlines. Fields are measured in a unit 'milligauss'. To give you an idea of the relative strengths of EMF, the following guide shows the typical magnetic fields from appliances and under powerlines.

| Common sources of EMF | Typical measurement (in Milligauss) | Range of measurements (in Milligauss) |
|---|---|---|
| Personal Computer * | 5 | 2-20 |
| Television * | 1 | 0.2-2 |
| Electric Blanket * | 20 | 5-30 |
| Hair Dryer * | 25 | 10-70 |
| Distribution Power Lines (under line) | 10 | 2-20 |
| Distribution Power Lines (8m away) | 2 | 0.4-4 |
| 33 kV UG cables (directly above buried cable) | 12 (1m above ground) | 3 (4m away) |
| Pad mounted distribution transformer | 2 (at 5m) | 1-20 (10m to close up) |
| Major zone substation | 2 (at fence) | 1-6 (at fence) |
| "Modular" substation | 1.5 (at fence) | 0.5-3 (at fence) |
| Transmission Power Lines (under line) | 20 | 10-200 |
| Transmission Power Lines (at edge of easement) | 10 | 2-50 |

(* Note: Appliance measurements taken at normal user distance)

The table above is based on a consistent set of measurements undertaken by power authorities in Australia, using similar techniques and protocols to overseas measurements.

The National Health and Medical Research Council (NHMRC) guidelines recommend the following limits of exposure:

- Public exposure to magnetic fields of 1000 milligauss continuous or 10000 milligauss for up to 2 hours/day
- Occupational exposure to magnetic fields of 5000 milligauss (for a working day) or 50000 milligauss for up to 2 hours/day
- Public exposure to electric fields 5 kV/m continuous or 10 kV/m for up to 2 hours/day
- Occupational exposure to electric fields 10 kV/m for a working day or 30 kV/m for 2 hours/day

ENERGEX requires that all of its powerlines comply with these exposure guidelines. The fields encountered from ENERGEX powerlines by members of the public are only a small fraction of these limits.

Further information is available from the websites:

Energex www.energex.com.au/network/asp/index.asp
Electricity Networks Associations http://www.ena.asn.au/

NORTH

LAWRENCE STREET

CABOOLTURE RIVER

BRUCE HIGHWAY

TRAFALGAR DRIVE

POSSIBLE 33kV ROUTE TO MORAYFIELD NORTH SUBSTATION (DICKSON STREET)

BUCHANAN ROAD

NOLAN DRIVE

MAIN GAS ROUTE

INDICATIVE ZONE SUB-STATION LOCATION

NOLAN DRIVE (EXISTING)

GRAHAM ROAD

COACH ROAD WEST

TO NARANGBA, APPROX 7km

MAIN GAS ROUTE

LAVER STREET

POSSIBLE 33kV ROUTE TO MORAYFIELD SOUTH SUBSTATION (CNR ROBBS & LINDSAY ROADS)

COACH ROAD WEST

GROGAN ROAD

POSSIBLE 11kV EXTENSION

POSSIBLE 11kV EXTENSION

BUCKLEY ROAD

COACH ROAD EAST

BRUCE HIGHWAY

GOLF CLUB

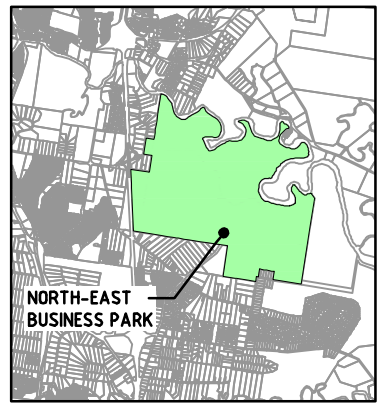
MARINA

FARRY ROAD

PRELIMINARY

## LEGEND

- EXISTING 11kV NETWORK
- PROPOSED 11kV NETWORK
- PROPOSED 33kV EXTENSION
- PROPOSED COMMS MAIN
- PROPOSED GAS SUPPLY MAIN
- OPTUS/UECOMM OPTIC FIBRE POINT OF PRESENCE
- TELSTRA OPTIC FIBRE POINT OF PRESENCE
- MIBA-DESIGNATED LOTS
- RESIDENTIAL LOTS (INC. MARINA & GOLF RESIDENTIAL)
- MARINA PRECINCT
- GOLF COURSE
- OPEN SPACE




LOCALITY PLAN

DATE PLOTTED: 10 October, 2007 - 5:06pm

lectel
technology engineering solutions
switched on performance
CABOOLTURE
11, 75 King St Q 4510
(PO Box 1658)
p 07 5431 6900
f 07 5431 6999
UNDERWOOD
1A, 130 Kingston Rd Q 4119
p 07 3489 6900
f 07 3489 6999
abn 51 088 857 470

| REV | DATE | REMARKS | SIGNED |
|---|---|---|---|
| A | 24-09-07 | CONCEPT PLAN | - |

| | | | |
|---|---|---|---|
| DESIGNED | G. ELSTON | G.E. | 12-09-07 |
| DRAFTED | S. GIBSON | S.G. | 24-09-07 |
| DRAFTING CHECK | P. BERRY | P.B. | 08-10-07 |
| DESIGN REVIEW | P. BERRY | P.B. | 08-10-07 |
| APPROVED | P. BERRY | P.B. | 08-10-07 |

# ELECTRICAL RETICULATION
# CONCEPT SITE LAYOUT & LOCALITY PLAN
# NORTH-EAST BUSINESS PARK
# CABOOLTURE

| | | | |
|---|---|---|---|
| CLIENT | NORTHEAST BUSINESS PARK PTY LTD | | |
| CAD FILE | ENX515_MasterPlan_RevA.DWG | UBD REF | 58 & 59 |
| | - | | |

| DRAWING No. | SHEET 1 OF 1 | REV | |
|---|---|---|---|
| ENX51-515 | SCALE : 1:5000 | A | A1 |