

---

This item was submitted to [Loughborough's Research Repository](#) by the author.  
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

## Incremental utilities provision and affordability

PLEASE CITE THE PUBLISHED VERSION

PUBLISHER

© WEDC, Loughborough University

VERSION

VoR (Version of Record)

PUBLISHER STATEMENT

This work is made available according to the conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) licence. Full details of this licence are available at: <https://creativecommons.org/licenses/by-nc-nd/4.0/>

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

Allen, David B., Forbes W. Davidson, and Alistair C. Blunt. 2019. "Incremental Utilities Provision and Affordability". figshare. <https://hdl.handle.net/2134/29981>.



## INCREMENTAL UTILITIES PROVISION AND AFFORDABILITY

DAVID B ALLEN  
FORBES W DAVIDSON  
ALISTAIR C BLUNT

Partner, Clifford Culpin and Partners  
Clifford Culpin and Partners  
Clifford Culpin and Partners

## BACKGROUND

With the cessation of hostilities and the re-opening of the Suez Canal the Egyptian Government initiated a policy to reinforce and develop the potential of the Canal Zone.

Clifford Culpin and Partners has been assisting the Egyptian Government implement this policy, as it relates to the Ismailia Governorate and in particular the City of Ismailia, since 1974.

The Ismailia Master Plan Study recommended guidelines for future development in all sectors. An important finding of the Study questioned the efficacy of Government policy with respect to housing provision. The Master Plan advocates a change from one of direct housing provision towards a more flexible system of aid and support for agencies which encourages greater involvement of the private sector and individuals and is affordable. Work on the Master Plan was followed by a demonstration project which developed in detail the Master Plan recommendations for housing and industry. Since October 1978, the firm has provided a team of technical advisors to assist the Governorate in the establishment of two land development agencies and in implementing the first low-income land sub-division (sites and services) and settlement upgrading project to be initiated in Egypt.

This paper concentrates on the Hai el Salam Project, the first of two projects currently being implemented in Ismailia. Hai el Salam (formerly El Hekr) is an area of uncontrolled, unplanned settlement north of the city. At the time work started on the project the population of the area was in the order of 37,000. Proposals for Hai el Salam cover an area of 226 hectares, within this area approximately 132 hectares were settled. The projected population to the year 2000, on the basis of new development and consolidation of the Project site, is 90,000.

The implementation of the Hai el Salam project began in 1978, with the establishment of a locally staffed Project Agency responsible to its own Board comprising representatives of relevant departments within the Governorate and the City. The Project Agency currently employs 40 staff comprising engineers, surveyors, accountants, senior administrators and

ancillary staff members. The majority of the staff are seconded from Governorate or City departments. Although the nature of the work was new to all staff they rapidly developed the necessary skills and an appreciation of the aims of the project through working with the expatriate technical advisors. The staff are progressively taking over responsibility for all day to day decisions affecting development.

The utility provision within the existing unplanned area, the area subject to proposals for upgrading, consisted of a few stand pipes in the southern part of the Project site supplied from an existing water main running east/west along the southern boundary. There was no sewerage network in the Project site, though one existed south of the southern boundary serving an area of public housing. This main was in a poor state of repair and had no spare capacity. The majority of the dwellings in the Project site had either pit latrines or single chamber semi-sealed septic tanks. The City Council ran an emptying service but this was not sufficient to adequately cover the whole area.

The density of the existing settlement was about 280 persons per hectare gross or about 50 households. Density levels varied over the Project site from the more densely populated and consolidated southern area to the northern fringes where single storey mud-brick shelters on large plots predominate.

Neither the physical and geological conditions found in the Project site nor the existing settlement pattern present insuperable problems for the physical upgrading of the existing unplanned area or for the provision of services to new plots on vacant desert land to the north of the Project site.

From social surveys and detailed case studies it was evident that finance would be a major constraint and proposals would require massive subsidy if existing housing policies were followed and subsequently implemented. Based on these findings the Master Plan recommended that policies should encourage the target population to meet their own housing needs by providing them with the right conditions in terms of land tenure, affordable services and other technical assistance.

## THEORY

The objectives of the Project included that proposals must be relevant to low-income groups, be affordable and capable of implementation with minimal subsidy. These objectives imposed critical constraints and made the assessment of affordability extremely important. In this respect the Consultants were conscious of the correlation between affordable development and appropriate standards and that these standards are often difficult to achieve because of prevailing political attitudes and aspirations, unrealistically high existing government health standards and building and other statutory regulations.

For the project design it was therefore essential to know how much could be afforded and what could be achieved with the finances available. Socio-economic sample surveys together with in-depth case studies were therefore undertaken and the conclusions drawn from these studies formed the basis of the assumptions used in developing the proposals, including incremental utilities provision. The most critical assumptions are summarised below:

- The proportion of total family income spent on shelter was taken as 20%;
- The proportion of this income allocated to infrastructure differed for upgrading areas and new sub-division areas. For upgrading areas the proportion was 65%, or 13% of total income, for new settlers the proportion was 50% or 10% of total income;
- What could be paid for, from the sum calculated as affordable, was based on amortisation at 7% over 20 years;
- Incomes and inflation would increase at the same rate over time;
- No external subsidy would be available.

The socio-economic surveys also indicated that a household's 'propensity to spend on housing' seemed to be tied to opportunities of building incrementally, perceptions of future security and secondary income, and other factors which have little to do with current income. Nevertheless a calculation of 'ability to pay' for shelter, as a percentage of total income, was applied to the household income distribution of the target population.

It is necessary to make a distinction between existing and new settlers; the former already are occupying a shelter and, if owner-occupiers, are allocating their assumed 20% of income for shelter to only improvements, utility connections to plots and secure land tenure. New settlers however must also pay for or build some form of shelter. In both cases the important question is the amount of income (or that fraction of the assumed 20% devoted to shelter) that will be allocated to infrastructure and plot connections.

Various proposals were examined which took

TABLE 1

HOUSEHOLD ABILITY TO PAY FOR SHELTER UNDER VARYING ASSUMPTIONS (1977 LE) (LE = £0.7 STERLING (1980)).

Annual income ranges: limits & mid-points	% Income for shelter	Monthly (LE)	Annual (LE)	Total available assuming amortisation at 7% over 20 years
150	15	1.9	22.5	238
	20	2.5	30.0	318
	25	3.1	37.5	397
180	15	2.3	27.0	286
	20	3.0	36.0	381
	25	3.8	45.0	476
240	15	3.0	36.0	381
	20	4.0	48.0	508
	25	5.0	60.0	635
300	15	3.8	45.0	476
	20	5.0	60.0	635
	25	6.3	75.0	794
390	15	4.8	57.8	609
	20	6.4	77.0	815
	25	8.0	96.3	1020
480	15	5.9	70.5	747
	20	7.8	94.0	995
	25	9.8	117.5	1244
660	15	8.3	99.0	1049
	20	11.0	132.0	1398
	25	13.8	165.0	1805
840	15	10.4	124.5	1318
	20	13.8	166.0	1758
	25	17.3	207.5	2197

account of existing and preferred plot sizes and uses, the lack of facilities and the desired and minimal levels of infrastructure provision necessary to ensure improved chances of health. These alternatives were costed. Based on the findings, reported on Table 1, an assessment was made of the amounts which might be available for infrastructure.

TABLE 2

ASSESSMENT OF CAPITAL AVAILABLE FOR INFRASTRUCTURE. (LE 1977)

Income	Existing settlers	New settlers
20th percentile household	273	210
Medium	400	310
80th percentile household	624	480

This assessment gives a rough indication of the order of magnitude of funds which existing and new settlers might be able to mobilize or be charged for infrastructure. However the issue is not straightforward: first, an infrastructure package includes land under secure tenure, and this represents an 'asset' which should be costed, especially if the future settlers can sell this 'asset' at market rates. Secondly, the use of 20% of income, as the proportion

affordable for shelter is arbitrary, and it should be recognised that there is frequently a large, if non-quantifiable, gap between 'ability' and 'willingness' to pay for shelter. Thirdly, there is nothing magical about amortising payments for shelter at 7% for 20 years.

Using the above assessment as a guide to the amount of finance available it was possible to compare the cost of various levels of infrastructure provision assuming a certain distribution of plot sizes. For the existing unplanned area the distribution of plot sizes was known, so it was possible, using existing income levels to postulate what levels of service provision were affordable. For new settlers, in new sub-division areas, plot charges were assumed to vary directly with plot size. Levels of affordability (ability to pay) indicated that not all households could afford similar levels of infrastructure provision. This was not surprising for, as indicated earlier, existing settlers allocate a smaller proportion of their total income to shelter than those settlers in the new sub-division areas (7% and 10% respectively).

Table 3 shows that there was a high proportion of families able to afford payment for Level 1 (infrastructure only in the case of the most basic provision) with freedom to choose plot size.

To enable affordable payments, at the low income levels, covering a higher standard of infrastructure provision (Level III), plot pricing, of plots in the new sub-division area and for new plots in the existing unplanned

area, was varied - higher prices being charged for good commercial locations and open market prices being charged for a number of concession plots in key locations. This allowed internal cross-subsidy of the low priced plots, some 60% of the total, thus increasing the level of provision affordable.

It should also be appreciated that in Egypt there is little opportunity for authorities to recover capital development costs except through land charges as there is no equivalent to the British 'rates system' on property and no recovery for the operating costs of water-borne sewage disposal, while water rates are also inadequate. The only directly recoverable cost is, therefore, the connection charge. Central Government directives laid down guidelines for the distribution of costs for sewage disposal and water. In this respect the relevant authorities are responsible for financing the cost of off-site works and the main on-site trunk lines. Plot allottees are expected to pay the cost of the local reticulation network and connection charges.

Table 3 identified broadly the levels of infrastructure provision affordable.

In the Hai el Salam project the amount of income available to be spent on infrastructure was therefore a minimum and as a consequence the level of infrastructure provision selected for the initial phases did not include individual connections for either water or sewerage. It was assumed that the costs of water borne sewerage and of water to each plot would, in the future, be financed, at least partially, by

TABLE 3

LEVELS OF INFRASTRUCTURE AND ABILITY TO PAY FOR TARGET POPULATION FAMILIES IN EXISTING AREAS AND NEW SUB-DIVISION AREAS. (NOTE THAT LAND COSTS ARE INITIALLY ZERO, BEING ORIGINALLY GOVERNMENT LAND).

Level of infrastructure provision	Percentage of target population households affording each level					
	Existing Settlers			New Settlers		
	83m <sup>2</sup> plots	123m <sup>2</sup> plots	176m <sup>2</sup> plots	72m <sup>2</sup> plots	108m <sup>2</sup> plots	135m <sup>2</sup> plots
Level I (administration, pit latrines, stand-pipes, basic local roads)	100	100	100	96	93	87
Level II (level I + electricity and landscaping)	100	100	100	87	81	78
Level III (level II + district and improved local roads)	100	87	69	79	72	66
Level IV (administration, water connections to plot sewerage network and connections + electricity)	48	33	17	41	30	23
Level V (as level IV + improved roads)	38	23	13	35	21	15
Level VI (as level V and trunk water-sewers and paved access roads)	24	14	5	17	11	6
Level VII (level VI + service core)	na	na	na	10	4	1

external subsidies. Further building regulations and planning standards in Egypt, as in many countries, are theoretically high, and meeting these standards makes a project unnecessarily expensive. These issues were addressed by preparing detailed proposals for the full provision of urban utilities as a long term goal, which could be reached incrementally over time consistent with the target. This proposal avoided problems of political and social acceptability while ensuring that project costs, and thus compulsory payments, could be kept to a minimum. A further advantage of this approach is that implementation can be effected early with minimal subsidy.

The implications of this strategy were examined. The estimated total costs of full water and sewerage system for the Hai el Salam project are given in Table 4.

TABLE 4

ESTIMATED 1977 COSTS OF FULL WATER AND SEWERAGE PROVISION HAI EL SALAM. (LE 1977)

Infrastructure	Water	Sewerage	Total
Connections	573105	884865	1457970
Reticulation Networks* (local mains)	612234	1109287	1721521
On-site trunk lines	370000*	510000	880000
TOTAL	1555339	2504152	4059491

\* excluding system costs of standpipes.

Using the same affordability assumptions referred to earlier the ability of inhabitants to pay a proportion of income towards full infrastructure provision was tested. It was found that 63% of existing households, and 55% of new households could reasonably afford to pay for water and sewerage connections, assuming finance for the full service provision was available. It was also estimated that the Project Agency could, if necessary contribute funds under a sharing arrangement with external funding sources and, subject to the effects of inflation, the future market values of concession plots and the possibility of communal labour contributions, the Project Agency could offer to meet between 30 to 55% of the future costs of the water and sewerage system.

The Consultants were well aware that by planning for staged future provision of water, sewerage (and roads) certain cost elements of initial stages would be written off. These costs were calculated for Hai el Salam to be on a plot basis, and are shown on Table 5.

These extra costs could not be avoided for Phase 1, which includes all existing settlers and 1000 new plots. For subsequent phases the situation is being carefully monitored

TABLE 5

THE COST/PLOT OF 'WRITING OFF' CERTAIN INITIAL DEVELOPMENT COSTS. (LE 1977)

	Existing settler plot	New settler plot
Water-borne sewerage; (the cost of pit latrine is written off)	-	105.0
Piped water; (a small portion of the cost of the standpipe system is written off)	0.9	0.9
Stage 2 roads; (a portion of the cost of Stage 1 road is written off)	14.0	12.0

#### THE PROPOSALS

The proposed water distribution network consists of a primary ringmain feeding four secondary ringmains each supplying water to approximately 24,000 inhabitants by the year 2000. Detailed proposals were also prepared for the future sewerage system.

In view of the users' ability to pay, the practical limitations imposed by existing major networks and the financial capabilities of the executing authorities, close attention was paid to the implications of staged provision.

The first level, as defined in terms of minimum public health benefits, is the provision of potable water in both new and existing areas by some 75 communal public standpipes on a 150 metre grid, supplied from the south of the Project site by a limited number of connections to the existing network.

The second level of provision is on-plot connections to a single tap and/or shower. The introduction of this level of provision in the initial stages is experimental, as it is constrained by the present difficulty of disposing of waste water and the insufficient capacity of city mains. The final level of provision is the installation of multi-tap metered water connections to each plot, which must be associated with a water borne sewerage system.

Proposals for waste water disposal are also staged. As a minimum level of provision pit latrines, regularly emptied by suction tankers, are proposed, as are septic tanks for public buildings requiring full water provision in advance of the sewerage system. The viability of disposing of sullage from on-plot water connections, without the installation of network drainage facilities, will also be tested experimentally. The final level of provision for waste water disposal is the installation of a full water-borne sewerage system.

It is proposed that a daily collection service for domestic refuse be provided on a house-to-house basis and be subsidised if necessary.

## THE REALITY

The Hai el Salam project was started in 1978 and at the time of writing May 1981, some 1,700 new plots had been allocated and 2,000 existing plots rationalised and title to the land sold to the occupants. At the end of the second year 25 standpipes had been provided and currently work has begun on the installation of three 6" lines which, when completed, will allow the Project Agency to provide a full standpipe service throughout the new subdivision areas. The Agency is also advising plot allottees on the design and construction of short-life seepage pit latrines.

In 1980 following the Consultants work on the Demonstration Projects, the Egyptian Government commissioned the Ismailia Water and Wastewater Master Plan Study, funded by USAID. The findings of this report, although subject to final approval by Government, have influenced the implementation of the Agency's utilities programme, particularly as it relates to human waste disposal.

One of the problems posed by this Study was the critical issue of timing and although the Hai el Salam Project area was identified as a priority area for design and development a number of issues affecting the immediate short-term were raised :

- How can the Agency's ongoing and extension programme be integrated, in the immediate short-term, with a completely new system proposed by the USAID programme?
- What are the immediate technical and financial consequences of the USAID programme on the Agency's intermediate solution for waste disposal?
- The USAID study recommends proposals for 'cost recovery' that, in part, contradict current accepted Egyptian practice. If the USAID proposals are adopted will the Agency's programme still be relevant and/or affordable?

Although the Consultants took cognizance of the financial consequences pertaining to an incremental approach, the problem experienced by the Agency, was one of timing and phasing. Further, unless the USAID programme was designed and implemented in full, the Agency's proposals for the Hai el Salam project, could prejudice the city-wide programme as a whole. It was therefore necessary for the Project Agency, in proposing intermediate short-term solutions, to re-examine standards of provision. Short-life pit latrines are a possible solution. The BRE/UK is currently advising the Agency for a pilot pit latrine programme and the cost implications of this programme as it affects individual plot holders, is being carefully monitored.

The USAID proposals for 'cost recovery' are through user charges for both water and sewage disposal. These proposals assume that running costs, the capital servicing and replacement cost and repayment costs must be borne by the user. As stated earlier this is contrary to current policy. If implemented it raises the

question of whether plot beneficiaries should be expected to pay twice for a service which is received free by other local public housing tenants.

It raises other questions which also needs resolving. For example, if 'cost recovery' is through user charges it assumes that all potential users will be connected to the network at the time of installation. This paper has illustrated that very few plot allottees, if any, are able to afford the cost of individual connections and use, although a proportion could reasonable afford to pay for water and sewerage connections, assuming that the cost of the service was borne by others.

The Agency's experience in implementing the Demonstration Project recommendations has therefore not been straight forward, particularly as it relates to human waste disposal. The programme has been affected by the need to examine the cheapest and most effective way of moving from the pour-flush latrine with semi-scaled septic tank or soakaway to a full sewerage system, within a very short time scale. This has meant that the Agency has given priority to minimizing costs.

Several lessons have been learned by the Consultants from the Hai el Salam experience:

- Intermediate solutions require more maintenance and is a factor that is often overlooked;
- Without very tight control and supervision it is impossible to connect a soakaway pit into a main system;
- Careful coordination between the authority and/or their consultants, responsible for planning and developing a new mains system, and the Agency responsible for the initial improvement programme is essential;
- An incremental approach to utilities provision assumes some options are left to the user. This may not be possible if the USAID programme is implemented as it assumes that all potential users will make connections at the time the network is installed;
- The phasing of other related developments and the upgrading of services must take cognizance of likely damage caused by the laying of water and sewer mains;
- The 'write off' cost of temporary solutions becomes a very important consideration. Even if the cost incurred is minimal and spread over several years, experience suggests that plot allottees would prefer a more expensive solution if it is seen as a once and for all payment;
- Cognizance of possible changes in official policy and/or attitudes should be allowed for in designing intermediate solutions.

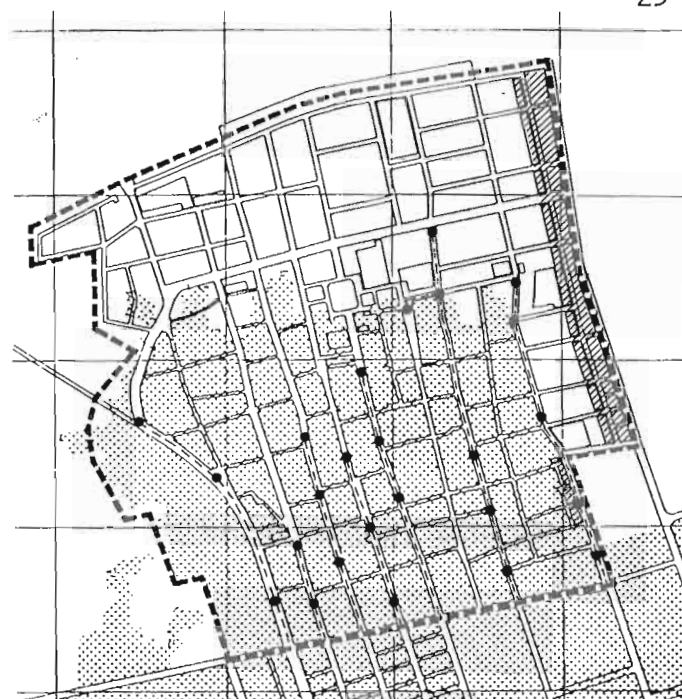
Starting from the premise that development proposals must be affordable the Hai el Salam project is a success. The initial political reservations for the concept have largely been overcome by emphasising the end-product and that

staged provision is a means to an end, and demonstrating that the process is not dissimilar to that adopted by most developed countries at a similar stage of development. The project has also demonstrated that it is possible to implement a major programme, within a very short time of proposals being approved, without massive Government or other subsidy and to give the target population, namely the poor, access to reasonable levels of shelter and services that can be afforded.

The Consultants recognise that incremental and intermediate approaches, while making sense in broad financial terms, do pose problems with respect to local expectations and practices. It is therefore incumbent upon consultants and advisors to be sensitive of prevailing attitudes, customs and constraints and be ready to respond positively and objectively and not be too dogmatic as to what can be achieved.

#### HAI EL SALAM PROJECT

- Rationalization of existing area. 132ha
- Sub-division of new area. 94ha
- Standpipe provision at end 2nd Year



Project Area  
Existing Settlement  
New Sub-division Area  
Concession Plots  
Standpipes

