

ANGUS COUNCIL

INFRASTRUCTURE SERVICES COMMITTEE AND
CORPORATE SERVICES COMMITTEE

24 NOVEMBER 2009
3 DECEMBER 2009

SALT STORAGE FOR WINTER ROADS SERVICES PURPOSES

REPORT BY THE DIRECTOR OF INFRASTRUCTURE SERVICES

ABSTRACT

This report recommends the construction of salt stores at Kirriemuir Road depot, Forfar and at Cairnie Road depot, Arbroath as a medium term efficiency saving and to reduce the impact on the environment of external stock piling of salt required for winter road maintenance purposes.

1 RECOMMENDATION

1.1 It is recommended that the Infrastructure Services Committee:

- (i) notes the discussions of the merits of the provision of storage buildings for road salt as set out in this report;
- (ii) instructs the Head of Roads to pursue the procurement and construction of a salt storage building at each of the depots (operated by Tayside Contracts) at Kirriemuir Road, Forfar and at Cairnie Road, Arbroath;
- (iii) agrees that £100,000 of the necessary capital costs be met from the Roads Capital budget provision in 2010/11.

1.2 It is recommended that the Corporate Services Committee:

- (i) notes the discussions of the merits of the provision of storage buildings for road salt as set out in this report;
- (ii) agrees that £100,000 of the necessary capital costs be met from the Efficiency and Reform Fund Capital allocation in 2010/11.

2 INTRODUCTION

2.1 The statutory duty placed on the roads authority to take reasonable measures to keep the public road network free of snow and ice conditions over the winter period as far as is reasonably practicable typically involves the timely applications of salt which depresses the freezing point of water. In Angus this typically requires the application of circa 12,000t of salt over the winter period. The annual cost of this salt provision amounts to some £400,000.

2.2 It has been found through experience that marine salt which is of high quality, performs better in practice than rock salt which tends to be of lower quality. Nevertheless in recent years it has become evident that rock salt can be employed successfully and the purchase price differential between the two can now be quite significant.

3 DETAILS

3.1 Marine salt can be stored in the open air quite successfully whereas rock salt generally requires to be covered, although both suffer losses through dilution from rain water (leachate) when stored in the open. This also has a potential deleterious environmental impact when the salt solution (leachate) finds its way into the natural environment.

- 3.2 In the past year or two the purchase price of both marine and rock salt have been subject to significant increases and relative fluctuations between the two as have the haulage/delivery costs. Clearly the proportion of stocks lost through leachate is wasteful. Further there were serious supply difficulties experienced during a period of peak demand nationally in the UK in February of 2009.
- 3.3 Accordingly consideration has been given to the detail of this and the merits of providing storage of salt indoors. A report has been prepared on the topic and is provided as Appendix 1 to this report.
- 3.4 It is recommended that the council moves to employing a balance of marine and rock salt and that basic storage enclosures are provided at the existing council depots at Kirriemuir Road, Forfar and at Cairnie Road, Arbroath; in both cases operated on the council's behalf by Tayside Contracts. Accordingly it is recommended that the Head of Roads commence the planning and procurement for same in conjunction with Tayside Contracts, so that these storage buildings be available for the winter of 2010/11.
- 3.5 Although there are capital costs involved in the procurement of these facilities it is anticipated that the revenue savings which will be realised year-on-year would recover the capital expenditure in a period of approximately five years as set out in the report in Appendix 1.

4 FINANCIAL IMPLICATIONS

- 4.1 It is anticipated that the capital cost of providing the two storage buildings will be approximately £200,000 as set out below and extracted from the report in Appendix 1.

	£000's
Capital construction costs 2 No @ £90k	180
Professional fees/staff time costs/licensing & consents	<u>20</u>
Total	<u>200</u>

It is recommended that this capital cost be met on an equal share basis from within budget target allocations for the Roads Capital Budget for 2010/11 and the Efficiency and Reform Fund Capital Budget for 2010/11 respectively. Appropriate adjustment will require to be made in the Financial Plan at the next review opportunity.

- 4.2 It is anticipated that the associated saving in the Roads revenue budget on an on-going basis from 2010/11 onwards will be £40,000 approximately, based on the reduction in the salt leachate.
- 4.3 The revenue cost in loan charge terms in respect of the capital borrowing will be on average circa £17,000 per annum over a period of 20 years.

5 HUMAN RIGHTS IMPLICATIONS

- 5.1 There are no human rights implications arising from the proposals in this report.

6 EQUALITIES IMPLICATIONS

- 6.1 The issues contained in this Report fall within an approved category that has been confirmed as exempt from an equalities perspective.

7 SINGLE OUTCOME AGREEMENT

- 7.1 This report contributes to the following local outcomes contained within the Single Outcome Agreement for Angus.

- We live in well-designed, sustainable places where we are able to access the amenities and services we need
- The importance and benefits to society of the environment is recognised.

8 CONSULTATION

8.1 The Chief Executive, Director of Corporate Services, Head of Finance, Head of Law and Administration, and Managing Director of Tayside Contracts were consulted in the preparation of this report.

9 CONCLUSION

9.1 It is recommended that salt storage buildings are constructed at Kirriemuir Road depot, Forfar and at Cairnie Road depot, Arbroath to deliver efficiency savings in the use of salt for winter road services and to contribute to the protection of the natural environment.

**ERIC S LOWSON
DIRECTOR OF INFRASTRUCTURE SERVICES**

NOTE:

No background papers, as defined by Section 50D of the Local Government (Scotland) Act 1973 (other than any containing confidential or exempt information) were relied on to a material extent in preparing the above report.

Roads/JG

Salt and Salt Storage

Future use of marine and rock salt for Angus Council



Report by Senior Service Manager Roads Division

August 2009 Revised October 2009

1 Introduction

- 1.1 The primary function of the winter maintenance service is to apply salt to the road network to prevent the formation of ice. The type of salt combined with its storage is therefore an important factor in delivering this service.
- 1.2 Traditionally Angus (following on from the previous TRC) has used marine salt. Extracted from salt water in the Mediterranean and transported by boat to the UK. The alternative indigenous (rock) salt mined in the UK is of a lesser purity and more susceptible to deterioration when stored outside, but is cheaper than marine salt.
- 1.3 During the season 2008/09 a quantity of rock salt was trialled successfully.
- 1.4 This report considers the council's future salt use and consequential storage.

2 Salt Quality

- 2.1 Marine salt (white) is 99.8% pure compared to rock salt (brown) which is required to be only 90% pure to comply with BS 3247.1991. It is possible to specify a higher purity of rock salt but the maximum is around 95%. Thus marine salt has 5% more active salt content. In contrast rock salt has 5% more impurities, approximately 3% of which are insoluble and can lead to detritus on the network, needing additional sweeping and gully emptying.
- 2.2 Moisture content of salt is a critical issue both at the time of purchase and spreading. Marine salt is treated with a caking agent to prevent the salt clumping together. Where this is washed out through exposure to rain, the salt forms a "thatch" on the outside of the salt pile and thereby prevents further deterioration from the weather when stored outside uncovered.
- 2.3 Rock salt can not be stored uncovered for long periods as it deteriorates, absorbing water and therefore requires to be covered. This can be achieved by the use of temporary covers which are large plastic sheets stitched together and which are ripped up during the loading of the salt. Alternatively purpose built structures, including specialised salt barns or domes maybe used. It is possible to store smaller quantities of rock salt uncovered for short periods in suitable weather conditions but such a strategy can not be relied upon throughout the winter.
- 2.4 Whilst marine salt has served the council well, trials of 95% pure rock salt in 2008/09 were successful with service levels maintained and no noted complaints/accidents. Approximately 1/5th of the salt used in 08/09 was rock salt. Angus Council is one of the few road authorities in Scotland using marine salt.

3 Salt Delivery

- 3.1 Marine salt is transported by large boat from the country of origin (Spain/Tunisia) and delivered from the UK port (including Montrose) by lorry to the depots. The larger boat results in one or two deliveries per season, usually during the summer with the salt stockpiled prior to the onset of winter. Due to its thatching characteristic the salt has a long storage life.

- 3.2 Currently the council holds 14,000t per annum which is normally sufficient for the whole winter season.
- 3.3 Further supplies are only required in severe winters and whilst feasible, they may be susceptible to sea conditions and smaller 'top up' quantities are not easily obtained and/or are at a cost premium.
- 3.4 On the other hand rock salt is available in relatively small quantities 1000-3000t in smaller boats, less susceptible to sea conditions due to the shorter coastal waters travelled. As the salt needs to be covered, and the capacity to cover with sheets or within a barn/dome is limited, the stock holding would be much smaller circa 4-6000t at any one time. The salt is usually delivered at prearranged times during the winter and can be managed through 'just in time' delivery system. The council's stockholdings would be more limited which reduced stock/financing costs. However the winter of 2008/09 and the demand for salt from authorities in England resulted in the need for a 'Salt Cell' to be established by Scottish Government to assist in controlling UK wide salt deliveries. Some councils reported failures of their suppliers to deliver sufficient quantities of salt on time with consequential issues for service delivery.
- 3.5 The risk involved in each method of delivery must be considered. If the council were to run out of salt, there may be a risk to life and the council may not fulfill its statutory duty under the Roads (Scotland) Act. The risk would be assessed as CII (as per Corporate risk management) and is therefore above the corporate risk "appetite" level.
- 3.6 The trial use of rock salt in 08/09 highlighted issues in terms of salt delivery. Whilst the original order for rock salt was received in time, the pressing need to restock due to the severe weather highlighted supply issues. Marine salt delivery was too long (albeit that some salt was received) and rock salt delivery was uncertain. The fact that the council, through Tayside Contracts, had both types of salt supply chains in place, working in combination, was a significant advantage giving flexibility which other councils did not have, using a single source.

4 Salt Storage

- 4.1 Uncovered storage outside leads to a loss of salt by 'leachate' whereby rain water dissolves salt which drains into the ground/watercourses.
- 4.2 Research indicates that up to 10% of salt may be lost through leachate although end of year reconciliations indicate lesser losses. Leachate is a problem environmentally as it has a detrimental impact on aquatic life. With the current location of depots the council has 'grandfather rights' that the environmental impact of the leachate does not have to be considered at this time but it may become an area of interest from SEPA in due course.
- 4.3 Leachate from smaller stock holdings, frequently replenished are less than that from a large stock pile delivered at the start of winter. Thus 'just in time' deliveries have an advantage over the current stock holding methods.
- 4.4 As noted above marine salt can be left outside uncovered but rock salt should be covered, unless only stored for a short period before use. Covers currently cost £2.50/tonne. Some leaching still occurs with potentially adverse

environmental impact. A prudential approach of using 5% has been taken as a reasonable figure for calculations of leachate.

- 4.5 The alternative to outside storage is the use of permanent structures which are normally barns/domes; or tunnel type structures. Barns or domes are purpose built structures and each type has some pros and cons, but both have substantial capital costs. Estimates for such a structure in Arbroath and Forfar are in the order of £200k each for a 2000t capacity or £275k each for a 3000t capacity. Design life is in excess of 25 years, with limited maintenance during this period. The structures are predominately timber due to the highly corrosive nature of salt (steel or reinforced concrete).
- 4.6 Bear Scotland Ltd have utilised tunnel type structures at their depots at substantially lower costs of approximately £90k each for 2500t but with an anticipated life of only 15 years compared to purpose built barn/domes of 25 years. These are relatively innovative structures which have substantially reduced the costs of providing covered storage.
- 4.7 Appendix 1 gives photograph of the typical structures.
- 4.8 Appendix 2 gives possible costs savings (covers, leachate etc.) and possible budget pay back periods for the two types of structure with varying salt price differentials.
- 4.9 Notably the capacity of storage buildings is limited, necessitating a move to managed salt stocks and "just in time" deliveries (as opposed to stock piling salt prior to winter).
- 4.10 It is noted that salt stored in Brechin and at various locations throughout Angus to supply the sub-contract farmers will be uncovered in comparisons as these are limited stockpiles which is regularly replenished as part of Arbroath/Forfar deliveries/stockpile as required.

5 Costs

- 5.1 The relevant costs between marine and rock salt varies depending on a number of factors:
 - Euro/pound (sterling) exchange rate for marine salt;
 - Fuel costs for delivery particularly for marine salt;
 - Demand, which may increase the UK price of rock salt following last year's (08/09) demand.
- 5.2 During 2008/09 the price differential between marine salt and rock salt increased from £5/t to £14/t due to the high fuel costs and poor £sterling v. euro. At current 09/10 prices the differential has returned to around a £4/t premium for marine salt.
- 5.3 Covers for rock salt cost equivalent to £2.50/t and noting the 5% purity benefit/less detritus benefits of marine salt, marine salt provides best value at current rates (£33/tonne). However marine salt has a greater exposure to financial variation and future fuel costs are more likely to increase rather than reduce.

- 5.4 The additional 5% purity of marine salt is considered to justify a premium in terms of the salt's performance in preventing ice/dealing with snow. Whilst there is no difference in the amounts used between rock and marine salt, as the spreading equipment is not sensitive enough to accommodate such differences, there is considered to be an overall benefit of using the purer salt which should be taken into account when comparing the costs.
- 5.5 Appendix 2 gives costs comparisons between rock salt and marine salt. For 09/10 the position is neutral. In 08/09 marine salt was a disproportionately higher cost and the trial carried out in that year reduced the council's exposure to the marine salt price increase.
- 5.6 However it must be noted that the costs of salt are increasing year on year, rock salt increased in cost by 16% in 2009/10.
- 5.7 Rock salt is a Category B commodity and joint purchasing arrangements for the whole of Scotland are being examined through Scotland Excel. This may have some bearing on the costs for future years. Marine salt is not currently an area being looked at by Scotland Excel, and is unlikely to be so, given the low number of Scottish users.
- 5.8 The purchase of salt has been highlighted in the UKLRG (Roads Liaison Group's) Review of the lessons to be learnt from the extreme weather conditions in February 2009. The Recommendation 2 (of 19) is that "authorities and salt suppliers should treat the supply of salt as a service rather than a simple commodity purchase".
- 5.9 Assuming that Scotland Excel takes on board this recommendation, purchasing rock salt through Scotland Excel will hopefully provide the savings sought from the McClelland report. A 2% savings has been considered reasonable to be expected from 2011/12.

6 Discussion

- 6.1 The purity and consistency of marine salt with its ability to be stored outside and stockpiled ahead of the winter season has served the council well.
- 6.2 Marine salt continues to demonstrate best value at 09/10 prices, taking recognition of its purity and ability to be used uncovered.
- 6.3 Long term permanent undercover storage offers environmental benefits but introduces supply timing risks with "just in time" deliveries. As the council's stock holdings is reduced to approximately 40% of the previous arrangements, supply chains will become critical but in light of last year's experience are unlikely to be guaranteed.
- 6.4 The use of barns/domes for marine salt has little financial benefit, requiring long pay back periods for the capital investment in the order of the life of the buildings. Thus, in line with previous thinking, barns/domes for marine salt are not recommended.
- 6.5 The advent of cheaper, shorter-life structures makes permanent storage more attractive although for marine salt the pay back period is still around 2/3rd of the life of the building.

- 6.6 Covered storage overcomes some of the disadvantages of rock salt and puts the operational use of rock salt on a more even position with marine salt. The pay back period for capital investment is much more attractive.
- 6.7 Salt prices are most likely to continue to increase year on year and therefore an investment at an early date in storage is likely to see the pay back period reduced as inflation takes affect.
- 6.8 There would be a significant change in moving from marine salt to rock salt in terms of supply management. The limited size of barns means that the stock holding would be reduced. Given that in snow conditions the salt is utilised at rates of 1500t/2 days, two storage structures with a capacity of 2500/3000t each would give only 7/8 days supply. UKLRG Review Recommendation no.8 suggests a resilience level of 6 days for a limited core network to be applied including those in southern England.
- 6.9 The risk of running short of salt is assessed as being above the corporate risk appetite, but could be managed below this threshold by balancing the advantages of salt barns and rock salt by retaining some marine salt stock. This would also give suitable resilience to the supply chain in the case of the repeat of a severe winter. It would also address those areas where outdoor storage will be required (Brechtin depot, sub-contracted farmers' storage).
- 6.10 This effective builds on the introduction of rock salt as per 08/09 season and as the experience of 'just in time' delivery successfully evolves then the use of marine salt could be further reduced.
- 6.11 For 2010/11 utilising 8,000t of rock salt and 6,000t of marine salt would deliver a savings of circa £40k in 2010/11 and future savings depending on marine salt usage and efficiencies from joint procurement through Scotland Excel. The savings are detailed in Appendix 3.

7 Conclusion

- 7.1 The price of salt, as most commodities, fluctuates. Unlike 08/09, the current differential between rock and marine salt costs do not justify a wholesale move to rock salt.
- 7.2 There is little financial advantage of investing in permanent storage for marine salt.
- 7.3 There is an adequate financial case to advocate the investment in permanent storage for rock salt, subject to capital funding being available. Funding is sought for the capital funding from the Efficiency and Reform Fund.
- 7.4 Switching to rock salt introduces a new risk above the corporate "appetite" line. This risk can be managed by retaining both a supply source and a stock pile of marine salt. The use of two sources of supply has advantages allowing a balance not only of the type of salt but the timing, storage and costs.
- 7.5 **It is recommended that the council moves forward with the construction of two salt storage units** of the "cover all" type which have substantially lower capital costs. The exact size of the units to be in discussion with the suppliers of both the units and the salt, and would be subject to statutory permissions.

- 7.6 The details of location etc are to be taken forward with Tayside Contracts in line with planning and SEPA requirements. A provisional programme is given in Appendix 4.

G-IAC-salt and salt storage report 20-10-09

Photograph 1 – “Cover All” type building 2500 Tonne capacity 62ft x 96ft for BEAR Scotland at Cunmont, Dundee. Approximate cost £90,000



Photograph 2 – Typical Salt Barn, supplied by Peacock, costs £200k for 2000t or £275k for 3000t



Photograph 3 – Salt Dome. A 1,600t dome in East Yorkshire

Salt storage for winter roads services purposes



Salt storage for winter roads services purposes

Comparison of Costs - Rock Salt v. Marine Salt

Costs £/t	08/09		09/10	
	Rock Salt	Marine Salt	Rock Salt	Marine Salt
Delivered price	25	39	29	33
Adjustment for purity (95% Marine Salt price)	25	37.05	29	31.35
Costs of leachate/losses at 5%	1.25	1.95	1.45	1.65
Cost of covering	2.50	-	2.50	-
Total Costs comparison	28.75	39.00	32.95	33.00
Savings offered by using rock salt/t compared to marine salt	10.25	-	Nil	-
Savings offered by using rock salt over season compared to marine salt	£123k	-	Neutral	-

Assumes 12,000 t /year average use

Salt storage for winter roads services purposes

REPORT NO 882/09

Payback for storage structures – Rock Salt v. Marine Salt (assumes a complete change to rock salt)

Costs £/t	08/09		09/10	
	Rock Salt	Marine Salt	Rock Salt	Marine Salt
Delivered price	25	39	29	33
Adjustment for purity (95% Marine Salt price)	25	37.05	29	31.35
Costs of leachate/losses at 4%*	1.00	1.56	1.16	1.32
Cost of covering	2.50	-	2.50	-
Possible savings using permanent storage	3.50	1.56	3.66	1.32
Annual saving based on 12,000 tonnes	42,000	18,720	43,920	15,840
Payback (years) for 2 structures @ £90k	4 years 4 months	9 years 8 months	4 years 1 month	11 years 5 months
Payback (years) for 2 structures @ £275k	13 years 1 month	29 years 5 months	12 years 6 months	34 years 9 months

* Assumes that whilst leachate will be reduced there will be some (1%) salt loss through handling/removal from storage

Assumes 12,000 t /year average use (noting Brechin depot will remain uncovered)

REPORT NO 882/09

Payback for storage structures - Rock Salt (assumes supplementary stock pile of marine salt)

Costs £/t	08/09	09/10
	Rock Salt	Rock Salt
Delivered price	25	29
Costs of leachate/losses at 4%*	1.00	1.16
Cost of covering	2.50	2.50
Possible savings using permanent storage	3.50	3.66
Annual Saving based on 8,000 tonnes	28,000	29,280
Payback (years) for 2 structures @ £90k	6 years 5 months	6 years 2 month
Payback (years) for 2 structures @ £275k	19 years 8 month	18 years 9 months

* Assumes that whilst leachate will be reduced there will be some (1%) salt loss through handling/removal from storage
Assumes 6,000 t /year marine salt stockpiled including Brechin and 8,000 t/year rock

Potential Savings

Opportunity	Savings available	£
Increase rock salt usage - 8,000t rock salt p.a.	£33marine - £29 rock - £2.50 covers = £1.50/t x 8,000	12,000
Utilise permanent cover	£2.50 covers + £1.00 leachate =£3.50/t x 8000	28,000
Savings (possible 10/11)		40,000
Increase rock salt usage - Move to 10,000t rock salt p.a. as confidence in 'just in time' deliveries increases	£4 salt+ £1 leachate = £5/t x 2,000t	10,000
National Procurement savings through Scotland Excel	Say 2% x 10,000 x £29	5,800
Total potential savings		£56,000

Assumes no capital recharge for salt barns and no inflation.

Provisional Programme

October 2009	Develop design/size/location
January 2010	Commence planning process
January 2010	Commence procurement process
June 2010	Secure planning and SEPA permissions
June 2010	Place Order
August 2010	Commence Construction of units
October 2010	Take delivery of rock salt